COMPOSITARUM MEXICANARUM PUGILLUS

by

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Introduction

The comments and discussions that follow, the new names, and descriptions of taxa new to science, are presented as a necessary preliminary to a treatment of the family Compositae for a proposed *Flora Novo-Galiciana.* The area covered by the flora includes the Mexican States of Jalisco, Colima and Aguascalientes, and some adjoining territory; for fuller description of it see Brittonia 13: 145–147. 1961, or Contr. Univ. Mich. Herb. 9: 1–7. 1966.

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The type-specimens of Mexican Compositae are concentrated in relatively few herbaria, and it has been possible for me to see most of them. In this country I am particularly grateful to the authorities of the United States National Herbarium (US) and the Gray Herbarium of Harvard University (GH). For the loan of selected specimens including the types of species of *Pinaropappus* described by T. S. Brandegee I am indebted to the Herbarium of the University of California at Berkeley (UC), and for sending me a fine series of specimens collected in Chiapas, to Dr. Peter H. Raven. In Europe very many types of Mexican Compositae are to be found either at Kew (K), the British Museum (Natural History) (BM), the Muséum National d'Histoire Naturelle, Paris (P), or the Conservatoire Botanique, Genève (G). To the many persons at these and other institutions who have permitted and aided my studies of the valuable collections in their charge, my sincere thanks.

The Compositae treated in the following pages are arranged alphabetically by tribes, and by genera and species within the tribes. In Mexico the Helenieae comprise a distinctive series of genera, and I have somewhat reluctantly accepted the dictum of Cronquist and others that there is no sufficient distinction between the Helenieae and the Heliantheae.

Specimens cited below are in the Herbarium of the University of Michigan (MICH), unless otherwise indicated. The drawings are by Karin Douthit except as noted in the text.

Tribe I. Astereae

Achaetogeron subacaulis McVaugh, sp. nov.

Herba perennis pilosa, subacaulis, caudice lignoso brevi ramoso, caulibus 20–40 cm altis, simplicibus vel ramis 1–3 erectis subbasalibus instructis; folia rosularia plerumque conspicua subtus purpurascentia, plerumque lobata, oblanceolata, 5–10 cm longa (petiolo marginato incluso), 1–2 cm lata, lobis 1–3 quoque latere, acutis vel obtusis, 3–10 mm longis; folia caulinia basalia similia, superiora gradatim angustiora, caulis supra medium elliptica, oblonga vel linearia, sessilia, integra vel unidentata, 1–3 cm longa, 1–5 mm lata; capitula solitaria vel subsolitaria, multiflora, pedunculis 4–10 cm longis; involucrum mox rotatum, phyllariis 60–70, subaequalibus, 4.5–6 mm longis, lineari-lanceolatis, 0.4–0.8 mm latis, subglandulosis, marginibus angustis scariosis, apicibus attenuatis, subaristatis, plerumque purpureis; flores ligulati ca 90–100, ligulis albis 7–8.5 mm longis, 0.5–1 mm latis; disci flores flavi, corollis 2.8 mm longis; antherae (appendicibus angustis inclusis) 1.2 mm longae, basi obtusae; styli ramuli complanati, apicibus breve triangularibus papillosis; achaenia (immatura) elliptici-

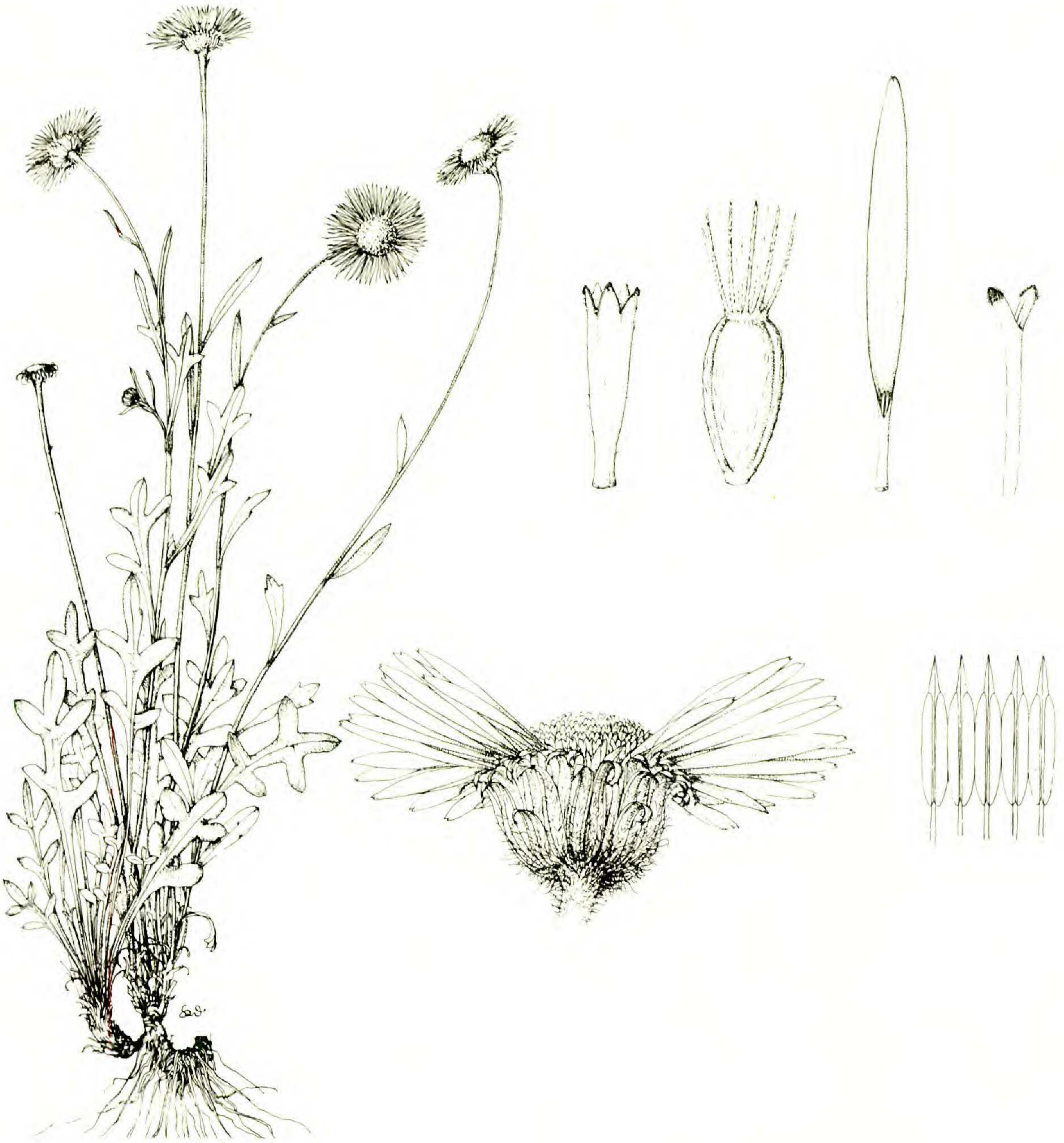

FIG. 1. *Achaetogeron subacaulis* (*McVaugh 18434*, type). Flowering plant, × ½; flowering head with rays partly removed, × 2; ray-corolla, × 5; disk-corolla × 7.5; style-branches and anthers, × 12.5; achene, × 15.

oblanceolata, compressa, 1.3 mm longa, rare strigosa, apice sub pappo contracta, marginibus incrassatis; pappi setae ca 10 barbellatae, fragilissimae 0.5–1 mm longae, maturitate caducae; receptaculum convexum vel late conicum, 6–7 mm latum.

AGUASCALIENTES: Sierra del Laurel, near the Jalisco border, ca. 15–16 km [10 mi] SE of Calvillo, above Rancho de los Adobes, in oak forest, elev. 2500–2700 m, 26–28 Aug 1960, *McVaugh 18434* (MICH, type). Known only from the type-collection.

I find no other Mexican species to which this can be referred. The combination of perennial subscapose habit, usually lobed leaves, long-peduncled solitary heads, non-glandular pubescence (except for that of the obscurely glandular phyllaries), and the pappus of about 10 very fragile short bristles but lacking a crown, seems to be unique both in *Erigeron* and *Achaetogeron.*

Aster brevilingulatus (Hemsl.) McVaugh, comb. nov. *Psilactis brevilingulatus* Sch. Bip. ex Hemsl. Diagn. Pl. 2: 34. 1879. *Machaeranthera brevilingulata* (Hemsl.) Turner & Horne, Brittonia 16: 324. 1964.

In recent years students of the Mexican flora have increasingly tended to combine *Psilactis* and *Machaeranthera* under the latter name. Taxonomically it is about as difficult to keep *Psilactis* out of *Machaeranthera* as it is to keep the latter out of *Aster.* As there has been no general agreement on the limits of *Aster,* I have chosen for purposes of the *Flora Novo-Galiciana* to treat it in the broadest sense and include the other genera in it.

Aster spinosus Benth., var. **jaliscensis** McVaugh, var. nov.

A var. *spinoso* ramis plerumque foliosis non spinosis; phyllariis interioribus 18–22, prope medium plerumque latioribus, apicibus obtusis, membranaceis, usque ad 1 mm latis; pappi setis rigidis, inaequalibus 2–4 mm longis; achaeniis 2.5–4 mm longis, differt.

TYPE: NAYARIT: Among rocks in the stream above La Laguna, 3 km NE of Santa María del Oro, elev. ca 1000 m, 16 Sep 1960, *McVaugh 19049* (MICH).

Resembling *Aster spinosus* var. *spinosus,* but even the ascending broomlike flowering branches seldom producing spines, and most plants leafy at least below. In var. *spinosus* the inner phyllaries are 25–30, usually widest near base and tapering to a narrow, subacute tip; the pappus consists of very fine capillary bristles 4–6 mm long, and the achenes are 1.7–2.3 mm long. Var. *spinosus* is a plant chiefly of the Central Plateau of Mexico at elevations of 1500–2200 m, whereas var. *jaliscensis* is a plant of foothills on the Pacific Slope in southern Nayarit and western Jalisco, from near sea-level to about 1300 m.

NAYARIT: Compostela, *McVaugh & Koelz 649, Graber 15;* Santa María del Oro, *McVaugh 19049* (type), *23526.*

JALISCO: Las Palmas, *McVaugh 25562;* Quimixto, *Mexia 1206;* Mpio. de Cabo Corrientes, S of El Tuito, *McVaugh 25401;* Ayutla, *Cronquist 9780.*

Baccharis multiflora H.B.K. Nov. Gen. & Sp. 4: 59. 1820.

The taxonomy of the group including *Baccharis multiflora, B. sordescens* DC., and *B. serraefolia* DC., has not been very satisfactorily worked out. Material from Nueva Galicia would be referred to *B. serraefolia* on the basis of Blake's treatment in the Trees and Shrubs of Mexico, because the heads are smaller than in typical *multiflora* and the phyllaries are not purplish. In all our material, however, the leaves are pinnately veined as in *B. multiflora,* whereas *B. serraefolia* was originally distinguished by DeCandolle because of its short, triplinerved leaves. Until the group can be revised, it seems better to treat our material as part of an inclusive *B. multiflora.*

The first-known variety of the species, *B. multiflora* var. *multiflora,* ranges in the uplands from eastern Michoacán (*Hinton 13361*) and the central part of the State of Mexico ("juxta Tianguillo et prope urbem Tolucae," *Humboldt & Bonpland!*, the type, at P[1]), to Hidalgo, Puebla and Guerrero. Our specimens seem to belong to two populations that occupy ranges nearer the Pacific Coast, in the mountains from western Jalisco to Michoacán. The leaves are mostly longer and narrower than in the typical variety, and the pistillate heads are smaller and paler. The involucre in staminate plants of *B. multiflora* varies in length from 3.5–4 mm through most of the range of the species.

Baccharis multiflora H.B.K., var. **brevipappa** McVaugh, var. nov.

A var. *multiflora* caulibus robustioribus usque ad 4.5 m longis, capitulis minoribus fem. ca 15-floris, phyllariis plerumque non valde purpureis, pappi setis 4.5 mm longis (non 6–8 mm); capitulis masc. 12–13-floris, involucro 3–3.5 mm longo, differt.

TYPE: JALISCO: Headwaters of Río Mascota south of El Rincón, 20–25 km SE of Talpa de Allende, elev. 1700–1900 m, 3–4 Apr 1965, *McVaugh 23463* (MICH).

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[1] Abbreviations used for herbaria are those of the *Index Herbariorum* (ed. 5; Regn. Veg. 31: 1–251. Utrecht, 1964).

A weak, moderately tomentose shrub 1.5–4.5 m high, the leaves narrowly elliptic, (4–) 8–13 cm long, 1–3 cm wide, 5–8 times as long as wide.

JALISCO: Talpa de Allende, *McVaugh 23463* (type); Nevado de Colima, *McVaugh 10096.* MICHOACAN: Coalcomán, Dos Aguas, *McVaugh 22707;* Pátzcuaro, *Rzedowski 22149.*

Baccharis multiflora H.B.K., var. **herbacea** McVaugh, var. nov.

Perennis, caulibus 1 m altis, rhizomatosis, pubescentibus, vix tomentosis; folia elliptica 2.5–7 cm longa, 1–2 cm lata, 2–4-plo longiora quam latiora; capitula fem. ca 22-flora, involucro 5–5.5 mm longo, phyllariis ca 30, stramineis, pappo 5.5–6 mm longo; capitula masc. ca 16-flora, involucro 3.5–4 mm longo, phyllariis ca 30, eis capitulorum fem. similibus sed brevioribus, pappi setis 4 mm longis, apicibus subclavatis complanatis.

TYPE: MICHOACAN: Coalcomán, pine-fir forests on limestone, near summits ca 25 km SW of Aserradero Dos Aguas, nearly west of Aguililla, elev. 2400–2500 m, 6 Mar 1965, *McVaugh 22846* (MICH). Known only from the type collection.

Evidently herbaceous, sparingly pilose with brownish, many-celled hairs, the upright flowering stems 1 m high or less, from creeping rootstocks.

Conyza dentonae McVaugh, sp. nov.

Annua, diffusa, ramis patentibus vel decumbentibus 8–20 cm longis prope basin oriundis; planta floccoso-tomentosa, phyllariorum apicibus exceptis; folia caulinia, alterna, sessilia, basi auriculata, laminis oblongo-linearibus, obtusis vel subacutis, 1–2.5 cm longis, 2–6 mm latis, plerumque crispatis, marginibus paucidentatis; capitula solitaria vel pauca in quoque ramo, 4.5–5 mm alta, 8–9 mm lata (compressa), 100–150-flora, pedunculis 1–1.5 cm longis vel brevioribus; involucrum 4 mm altum, basi truncatum vel late rotundatum, phyllariis ca 35–40, mox rotatis vel reflexis, interioribus 30–35 subaequalibus, subscariosis, lineari-subulatis, 0.3–0.6 mm latis, marginibus anguste hyalinis, apicibus acutis, erosis, membranaceis, phyllariis exterioribus gradatim brevioribus 5–8, per lanam suboccultis; flores hermaphroditi 7–11, corollis 2.5 m longis; antherae appendicibus anguste triangularibus inclusis 1 mm longae, basi obtusae; flores feminei filiformes, 2 mm longi, ligulis angustis 0.2–0.4 mm longis instructi; achaenia 1–1.3 mm longa, 0.4 mm lata, subsericea, compressa, elliptico-oblanceolata, enervosa, prope apicem glandulosa; pappi uniserialis setae ca 15, graciles, albo-flavidae, 2–3 mm longae; receptaculum convexum, 2.5–3.3 mm latum, phyllariis post anthesin arcte reflexis circumcinctum.

Species eius inventori Melinda Fay Denton (1944–), Oxalidis aliarumque plantarum mexicanarum studiosae, nominavi.

TYPE: JALISCO: Heavily overgrazed nearly level grasslands near km 18, SW of Ojuelos on the road to Aguascalientes, elev. 2175 m, 15 Aug 1958, *McVaugh 16974* (MICH).

Distinguished from the other cottony-tomentose species of *Conyza* in our flora by the uniseriate pappus (pappus biseriate in *Conyza confusa* Cronq., *C. filaginoides* DC. and *C. gnaphalioides* H.B.K.) and by the short ligules (these 0.7–2 mm long in *C. confusa,* wanting in *C. filaginoides* and *C. gnaphalioides*). In *C. confusa* the leaves are green and glabrous or nearly so above; in *C. filaginoides* the flowers are only 40–50 in a head; in *C. gnaphalioides* the achenes are obovate and 1–1.4 mm wide.

JALISCO: Km. 18, SW of Ojuelos, *McVaugh 16974,* type.
ZACATECAS: 14 mi [ca 22 km] E of Sain Alto, *Shreve 9204;* 25 mi [40 km] NW of Fresnillo, *Waterfall 15594.*

Haplopappus venetus (H.B.K.) Blake, var. **hartwegii** (A. Gray) McVaugh, comb. nov. *Bigelovia hartwegii* A. Gray, Syn. Fl. N. Am. 1, pt. 2: 143. 1884.

Harvey Monroe Hall, the monographer of *Haplopappus,* maintained *H. venetus* and *H. hartwegii* as separate species. He seems to have seen little material from central Mexico, but to have based his interpretation chiefly upon specimens from areas to the north and northeast of Nueva Galicia. He described the corolla-lobes of *H. hartwegii* as

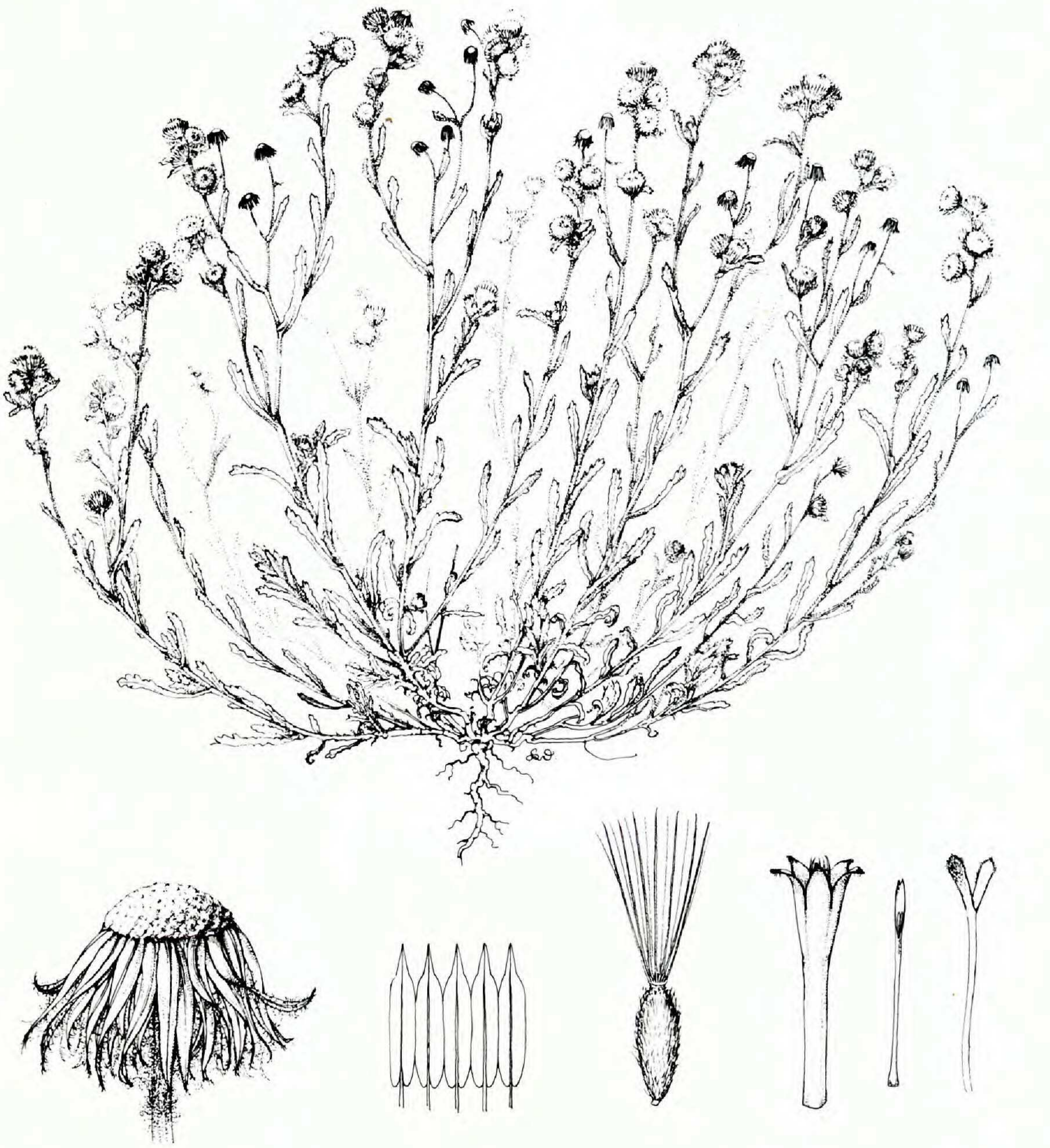

FIG. 2. *Conyza dentonae* (*McVaugh 16974,* type). Flowering plant, X ½; over-mature fruiting head, X 5; corollas, style-branches, achene, X 10; anthers X 15.

1–1.3 mm long; in the abundant material now available, the lobes are usually 0.6–0.8 mm long, whereas in typical *H. venetus* they average 0.7–0.9 mm long. In occasional plants of either variety they may be as much as 1 mm long. The leaves in the two varieties are noticeably different, those of var. *hartwegii* usually narrower and more definitely pinnatifid.

Solidago stricta Ait. Hort. Kew. 3: 216. 1789.

Among the plants recently collected in Chiapas by D. E. Breedlove are several specimens of a *Solidago* with nearly glabrous, virgate inflorescence, long entire basal leaves, and erect, narrow and sharply reduced upper cauline leaves. As apparently no species answering this description had ever been reported from this part of Mexico, the identification of the plant was of special interest. It transpires that a few other collectors have found the same plant in Chiapas, and a very similar one at a few lowland localities near the Atlantic coast of Mexico.

The plants thus occur in Mexico in two very different habitats. One group of specimens is from "steep moist slopes" or "bogs" in the moist forested mountains of the interior of Chiapas, at elevations ranging from about 1000 to about 2100 meters. Two other specimens are from river-mouths in Veracruz and Tabasco, respectively, and thus grown under maritime conditions. I cannot separate the upland from the maritime plants, except that in the latter the involucres are very slightly longer (4–4.5 mm as against 3.5–4 mm), and in one specimen (*Purpus 6298*) the rays are as many as 11, whereas in the upland specimens the rays are usually 4–5 (or in *Breedlove 7108,* 5–8).

The upland plants are scarcely distinguishable from *Solidago stricta* of the southeastern United States, except that the specimens are more vigorous than usual, with slightly larger upper cauline leaves, and somewhat thicker, longer, inflorescences; the leaves are always scabrous-margined (in *stricta* usually but sometimes obscurely so), and the inflorescence is always slightly pubescent (in *stricta* rarely entirely glabrous, but usually obscurely pubescent).

Plants of the upland population are often 1 m high, with virgate or narrowly cylindrical inflorescence 15–20 cm long and 2–4 cm thick, or in more vigorous plants 30 cm long, 5–7 cm thick, with numerous strongly ascending and often revolute-secund branches 5–10 (–15) cm long; the leaves are all entire, glabrous and scabrous-margined; those of the basal rosette are obtuse, 15–20 (–35) cm long and 1.5–2 cm wide; the cauline leaves are numerous; those on the lower half of the stem are like the basal ones but shorter; the upper half of the stem below the panicle bears 10–20 more or less erect and appressed, lanceolate or elliptic and usually callose-pointed leaves 2–5 cm long, 2–5 mm wide; the branchlets of the panicle, and the peduncles, are minutely but evidently antrorsely hispidulous; the heads are 5–6 mm long, the ray-flowers and involucres as described above; the mature achenes are sparingly or rather densely pubescent, 1.5–2.2 mm long.

Specimens examined:

CHIAPAS: Without locality, *Ghiesbreght 124* (GH, with note by M. L. Fernald, "This is *S. stricta* Ait."); Ocuilapa, 21 Aug 1895, *E. W. Nelson 3006* (GH); Margaritas, Comitán, 6 Jun 1945, *E. Matuda 15801;* Mpio de San Cristóbal de las Casas, elev. 2100 m, 24 Aug 1964, *Breedlove 7180,* 3 Aug 1966, *Breedlove 14705*; Mpio. de Tenejapa, 30 Sep 1965, *Breedlove 12566* (DS), 28 Nov 1964, *Breedlove 7769,* 16 Jul 1964, *Breedlove 6525,* 14 Jul 1965, *Breedlove 11005;* Mpio. de Teopisca, 25 Jun 1965, *Breedlove 10540.*

Two Mexican specimens from maritime habitats, because the plants have slightly larger heads with more numerous flowers, are apparently referable to what has been called *Solidago sempervirens* var. *mexicana* (L.) Fernald. This variety, however, as recognized in current manuals and floras, seems about as closely similar to *S. stricta* as to *S. sempervirens,* and a reconsideration of specific limits in the entire group seems to be needed. Although many authors have separated *S. sempervirens* from *S. stricta* on the basis of maritime vs. non-maritime habitat, the morphological distinctions between them have never been very satisfactorily set forth.

Asa Gray (Syn. Fl. 1, pt. 2: 149-150. 1884) treated *Solidago mexicana* L. (Sp. Pl. 879) as a synonym of *S. sempervirens L.* (Sp. Pl. 878). He separated *S. sempervirens* from *S. stricta* Ait. as follows:

Flowering rather early, commonly stout and middle sized or tall; general inflorescence paniculate or hardly strict, leafy at the base; upper leaves not notably unlike the lower ones and not appressed; inflorescence occasionally pubescent; rays 7–10; heads 4 or 5 lines long, or in slender forms only 3 lines long. *S. sempervirens.*

Late-flowering, wholly glabrous, virgate, the upper portion of the stem beset with small appressed leaves; heads (commonly 3 lines long) in a strict and narrow naked panicle; rays 5–7. *S. stricta.*

Of *S. stricta* var. *angustifolia,* Gray went on to say "Forms in brackish soil not clearly distinguished from the most slender and narrow-leaved *S. sempervirens.*"

The original source of *Solidago mexicana* was unknown to Linnaeus, but he supposed it to have come from Mexico. A specimen in the Linnaean Herbarium (no. 998–13) bears large leafy bracts in the inflorescence, and seems on the basis of a photograph to resemble *S. sempervirens* except that the heads may be slightly smaller than in the common *sempervirens* of the eastern United States. Fernald (Rhodora 37: 447–448. 1935) took up the Linnaean name, and recognized, as *S. sempervirens* var. *mexicana* (L.) Fern., a plant with "narrower leaves and smaller heads," and branches of the panicle "often hirtellous." He said also "Much of the southern material of var. *mexicana* has been misidentified as . . . *S. stricta* Ait. . . . [*S. stricta*], however, has a stoloniferous base, very reduced upper cauline leaves and quite glabrous inflorescence."

In *Gray's Manual* (ed. 8. pp. 1398–1399. 1950) Fernald emphasized that *stricta* was "glabrous throughout," the "rhizome horizontal or ascending, finally producing slender stolons," the involucres 4–5 mm high. He described *sempervirens* as having involucres 4–7 mm high, mature achenes 2.2–3.5 mm long, and the rays 8–10; var. *mexicana* was described as having the heads "slightly smaller," the branches "usually hirtellous," and the cauline leaves "frequently ciliolate."

According to Cronquist (in Cronquist & Gleason, Man. Vasc. Pl. 712. 1963), *S. sempervirens* var. *sempervirens,* with 12–17 rays, ranges as far south as Virginia, whereas var. *mexicana,* with 7–11 rays, and involucre 3–4 or occasionally 5 mm long, is southern. In the same publication *S. stricta* is described as having the involucre 4–6 mm long, and the rays 5–7.

The differences between the two species thus are seen to be mostly those of size of heads, number of rays, size of cauline leaves (especially relative to the basal leaves), and the presence or absence of stolons. The pubescence-character by itself is not very useful, as some specimens of *sempervirens* are essentially glabrous, but almost no specimens of *stricta* are completely destitute of the tiny antrorsely directed bristle-like hairs that occur on the peduncles and the small branchlets of the panicle.

The following specimens, like *sempervirens,* come from a maritime habitat. They are unlike that species, as usually described, in having very sharply reduced upper leaves (as in *stricta*), the achenes 2 mm long or less (as in *stricta*), and the branchlets very sparingly pubescent as in the upland Mexican representative of *stricta* (not "hirtellous" as in many North American specimens referred to *S. sempervirens* var. *mexicana*). As mentioned above they resemble "*S. sempervirens* var. *mexicana*" in having slightly larger heads than the upland plants from Chiapas, and because of the fact that the rays in one specimen are 11 in number.

VERACRUZ: Mouth of Río de la Antigua, Sep 1912, *C. A. Purpus 6298* (GH).
TABASCO: Mouth of Río Grijalva, Frontera side, 23 Apr 1963, *F. D. Barlow 19/1.*

Xanthocephalum gymnospermoides (A. Gray) Rothr., var. **eglandulosum** McVaugh, var. nov.

Annua, glabra glutinosaque, usque ad 1.5–1.8 m alta, a var. *gymnospermoide* ramulis pedunculisque eglandulosis differt.

JALISCO: Grassland 9 mi [14–15 km] S of Yahualica; seepage areas in wet mud, elev. ca 1860 m, almost past flower 6 Nov 1959, *McVaugh & Koelz 265* (MICH, type).

ZACATECAS: Sierra de los Morones, near Plateado, 1 Sep 1897, *Rose 2720* (K). Otherwise unknown.

The group of coarse annuals that includes *Xanthocephalum gymnospermoides,* and *X. benthamianum* Hemsl., may eventually be treated as a single species. There are scarcely any quantitative differences between them, but superficially they look very different because the leaves in *X. benthamianum* are more coarsely toothed and because the herbage (including the phyllaries) in that species is abundantly provided with gland-tipped hairs, whereas in *X. gymnospermoides* the gland-tipped hairs are restricted to the small branchlets and the peduncles. In this new variety, which as far as known has a distinctive geographical range, gland-tipped hairs are essentially wanting; the whole plant is uniformly gummy but otherwise glabrous.

Tribe II. Cichorieae

New Varieties of *Lactuca graminifolia*

In tropical America the genus *Lactuca* is represented by a very small number of species, and these species are seldom taken by collectors. It is therefore of unusual interest to find, among the collections recently made in Chiapas by D. E. Breedlove and Peter H. Raven, an ample series of specimens of a perennial "pink" or purplish-flowered *Lactuca.* The affinities of this plant appear to be with the group of temperature North American species having strongly flattened achenes with an elliptic body and a very slender and delicate herbaceous beak about a third to a half as long as the body. This is the group that includes *Lactuca graminifolia* Michx., *L. hirsuta* Muhl., and *L. ludoviciana* (Nutt.) Ridd. The species, if they are correctly so regarded, are not easily separated, and an experimental investigation of the entire complex would be worthwhile. The differences between the supposed species have been expressed mostly in terms of vegetative structures (see, for example, Gray's Man. ed. 8. p. 1554. 1950).

The Chiapas plant, described below as a variety of *Lactuca graminifolia,* occurs in moist forested areas at moderate elevations (mostly between 1500 and 2500 meters), where it is associated with species of *Quercus, Pinus, Liquidambar, Podocarpus* and other trees. From this same habitat many species and genera of "temperate" affinities have been reported in recent years by A. J. Sharp and others, so it is not surprising to find that this plant seems to represent a distinct and well-established population of a species already known in southeastern United States. The following key contrasts the Chiapas plant with what appear to be its closest relatives:

1. Soft beak 2–2.5 mm long or more, usually a third to a half as long as the body of the achene; cauline leaves numerous, rather uniformly distributed along the stem, the rosette leaves often not present at flowering time; flowers yellow (or sometimes blue).
  2. Lower bracts of the inflorescence leafy, considerably larger than the upper ones; cauline leaves, even the upper ones, with acuminate auricles at base; soft beak usually 2.5 mm long or more; flower color usually recorded as "pale blue" or lavender, sometimes as yellow; central United States. *L. ludoviciana.*
  2. Lower bracts of the inflorescence not enlarged and leafy; cauline leaves narrowed to the base, not auriculate; soft beak 2–2.5 mm long, almost half as long as the body; flower color usually recorded as yellow or "coppery"; mostly northeastern United States. *L. hirsuta.*
1. Soft beak 1–2.5 mm long, usually one-third as long as the body of the achene, or less; cauline leaves usually much reduced at least in the upper part of the stem, the rosette leaves often conspicuous at flowering time; flower color recorded as "purple," "purplish blue," "pale blue," lavender, "pink," or white.
  3. Cauline leaves usually narrow and entire or with narrow lobes, evidently different from the radical leaves, the plants often subscapose.
    4. Multicellular foliar trichomes usually none; inflorescence usually ample, diffusely branched; soft beak 1.5–2.5 mm long; Coastal Plain of southeastern United States. *L. graminifolia* var. *graminifolia.*
    4. Multicellular foliar trichomes probably always present (especially on the leaf-margins and on the midvein of the lower surface); inflorescence sparingly branched, the primary branches often simple; soft beak 1.5–2 mm long; mountains of Arizona, New Mexico and extreme western Texas. *L. graminifolia* var. *arizonica.*
  3. Cauline leaves usually like the radical ones, relatively little reduced in size up to the middle of the stem or above, the uppermost sometimes narrow and entire; multicellular trichomes probably always present; inflorescence usually ample, diffusely branched; soft beak 1–1.7 (–2) mm long; Sierra Madre Oriental of Mexico, to Guatemala. *L. graminifolia* var. *mexicana.*

The following plant of the mountains of southwestern United States has customarily been referred to *Lactuca graminifolia.* It differs consistently in several respects from the nomenclaturally typical variety, and may be named and described as follows:

Lactuca graminifolia Michx., var. **arizonica** McVaugh, var. nov. Var. *graminifoliae* similis; folia basalia trichomatibus semper instructa; folia caulinia basi exauriculata; rostri pars gracilis 1.5–2 mm longa, quam achaenium ca triplo brevior; flores caerulei; paniculae rami primarii 2–6 (–10) cm longi, saepe simplices.

Pine forests, and in canyons and other relatively mesic habitats in semiarid mountains, at elevations of 1000–2400 m, flowering from May to July or as late as September.

ARIZONA: COCHISE CO.: Dos Cabezas Mts., Magnesia Spring, May 1881, *J. G. Lemmon 228* (GH); Huachuca Mts., Miller's Canyon, 15 Jun 1909, *L. N. Goodding 139* (GH); Chiricahua Mts., Cave Creek, 22 Sep 1929, *Harrison & Kearney 6192* (GH). APACHE CO.: Willow Spring, 10–20 Jun 1890, *E. Palmer 510* (GH). PIMA–STA. CRUZ CO.: Santa Rita Mts., 27 May 1881, *C. G. Pringle* (GH). COCONINO CO.: Flagstaff, 12 Aug 1884, *M. E. Jones 16* (GH); Oak Creek Canyon, 18 Jun 1944, *O. M. Clark 11860* (GH). GILA CO.: Sierra Ancha Mts., 5 Jun 1946, *F. W. Gould 3581* (GH, NY).

NEW MEXICO: Without locality, *Fendler 504* in 1847 (GH). GRANT CO.: Foot of Twin Sisters, near Silver City, 22 Jun 1880, *E. L. Greene 143* (GH, type).

TEXAS: CULBERSON CO.: Guadalupe Mts., above Frijole P.O., elevation "8000 ft.," 10 Aug 1930, *C. O. Grassl 133.*

What seems to be nearly typical *L. graminifolia* var. *graminifolia* also occurs in northern Mexico. In these specimens the cauline leaves are numerous, well scattered along the stem, very long and narrow, the lower ones narrowly pinnatifid and bearing scattered trichomes, the upper ones linear; the panicle is ample, with subulate bracts subtending even the lower branches; the beaks are 2 mm long or a little more, which is about average for var. *graminifolia:*

MEXICO: NUEVO LEON: "Sierra Madre Mts.," Monterrey, 23 Jul 1933, *C. H. & M. T. Mueller 285* (GH); Dulces Nombres, 24° N., ca 100° W, elev. 1500 m, 15 Jul 1948, *Meyer & Rogers 2787* (US).

In the mountains of central and western Texas and northern Mexico, also, there are populations that seem to be intermediate in some ways between *Lactuca ludoviciana* (a species primarily of the Great Plains), and another species, possibly *L. graminifolia.* These plants have numerous cauline leaves that are thinner, and somewhat more deeply and narrowly pinnatifid, than those of *L. ludoviciana,* and lack the closely spinose-denticulate margins of the leaves of that species. The larger outer phyllaries are not very broad (compared to those in e.g. *L. graminifolia*), but the beaks are mostly more than 2 mm long, and the lower bracts of the panicle are leafy. Examples of these plants are:

TEXAS: "Near Dallas," *J. Reverchon,* Jun 1874 (GH); BURNET CO.: 1 mi west of Marble Falls, 6-4-1945, *V. L. Cory 49569* (GH); KERR CO.: Laceys Ranch, 10 Jun 1917, *E. J. Palmer 12220* (GH); PRESIDIO CO.: Knox Canyon, elev. 1525 m, 20 Jul 1941, *L. C. Hinckley 2038* (GH); BREWSTER CO.: Oak Canyon, Chisos Mts., elev. 1370 m, 4 Jul 1931, *Moore & Steyermark 3393* (GH, MICH).

MEXICO: COAHUILA: Sierra Hechiceros, near the Chihuahuan boundary, 27–29 Sep 1940, *R. M. Stewart 123* (GH); Sierra de los Guajes, 10 Sep 1941, *Stewart 1521* (GH).

NUEVO LEON: Hacienda Vista Hermosa, 35 mi south of Monterrey, elev. 750 m, 26 Jun 1939, *S. S. White 1533.*

TAMAULIPAS: Vicinity of Victoria, elev. 320 m, May–Jun 1907, *E. Palmer 447* (GH, NY).

One specimen from northern Mexico is superficially much like those cited above, but the lower bracts of the panicle are not leafy, and the beaks are no more than 1.5 mm long. In 1931 S. F. Blake identified this plant as "Intermediate between *L. canadensis* L. and *L. ludoviciana* (Nutt.) Riddell." As apparently *L. canadensis* has not been reported from this part of Mexico, and as representatives of *L. graminifolia* are known to occur nearby, it seems more probable that if the following is an "intermediate," that is to say of hybrid origin, the most likely parents are *L. ludoviciana* and *L. graminifolia.*

MEXICO: TAMAULIPAS: Sierra de San Carlos, vicinity of San José, Cerro Barril, elev. 1380 m, 19 Jul 1930, *H. H. Bartlett 10493.*

In the following variety the tendency to produce cauline leaves (which are often auriculate) suggests some remote evolutionary connection with a species like *L. ludoviciana,* but in other respects the plants are not very different from those of the other varieties of *L. graminifolia:*

Lactuca graminifolia Michx., var. **mexicana** McVaugh, var. nov.

Perennis, subscaposa, glabra (phyllariorum apicibus minute puberulis), 1–1.5 m alta, foliis radicalibus 15–30 cm longis, 5–8 cm latis, plusminusve runcinato-pinnatifidis, marginibus et costa (subtus) sparsim trichomatibus multicellularibus instructa; folia caulinia vel lobata vel integra, basi plerumque auriculata, auriculis acuminatis; capitula 14–17 mm longa, angusta, phyllariis interioribus 8, subaequalibus, angustis, 11–16 mm longis, phyllariis exterioribus gradatis 8–10, multo brevioribus; achaenia 4.5–6 mm longa (rostello conico incluso), in rostrum fragile tubuliforme 1–1.7 longum prolongata. A var. *graminifolia* rostro breviore, foliis caulinibus majoribus auriculatis, trichomatibusque foliaribus; et a var. *arizonica* rostro paullo breviore, foliis caulinibus paniculisque diffusis, differt.

Perennial; foliar trichomes flexuous, up to 2–3 mm long; leaves often in a basal rosette, the rosette leaves and the lower cauline leaves deeply pinnatifid, the 2–4 pairs of lobes at right angles to the long axis or usually directed backward, usually acute and sometimes themselves again lobed, the sinuses between the lobes broad, rounded; margins with a few spinulose teeth; leaf-rachis between the lobes 4–10 (–15) mm wide; petiolar base 2–5 (–10) cm long, about as wide as the rachis, proximally slightly widened (except in the lowermost leaves) and prolonged into acuminate auricles; cauline leaves decreasing in size upward, and with smaller lobes; leaves above the middle of the stem, if any, often narrowly lanceolate and entire, usually auriculate; inflorescence a diffusely branched, subcorymbose panicle of many ascending principal branches, these 10–20 cm long, from the upper third or half of the plant; bracts at the base of the branches subulate, 3–10 (–15) mm long; heads numerous, erect, 14–17 mm long in fruit, solitary at the tips of the principal branches or lateral secondary peduncle-like branchlets 1–5 cm long, each peduncle usually bearing several small bracts and sometimes abortive heads in the axils of the bracts; inner phyllaries pale green with narrow hyaline margins, nearly linear, 1.5–2 mm wide, gradually tapering to an obtusely pointed tip, thin and fragile except at the slightly indurated bases, strongly reflexed and persistent after anthesis, exposing the (finally) convex, lustrous, slightly pitted receptacle 2–3 mm wide; outer phyllaries 8–10, imbricated and very unequal, lance-ovate or the outermost broader, the longest one half as long as the inner series or a little longer; flowers 18–21, lavender or purplish, "pink" or white, at anthesis about 5 mm longer than the phyllaries; anthers about 2 mm long; achenes nearly black (dark brown), without conspicuous nerves, or the midline convex on both sides; body elliptic, strongly flattened, terminated by an acute rostellum like the body in color and texture, this passing into a slender pale or green, softly herbaceous beak much shorter than the body; surface of the achene minutely and sinuately cross-striate, the striae (especially along the midline) antrorsely echinulate; body of achene 1.5–2.3 mm wide, 4.5–6 mm long including the rostellum, the soft part of the beak 1–1.7 (–2) mm long, enlarged distally into a disk about 0.5 mm in diameter, from the margin of which arises the pappus; pappus bright white, 8–9 mm long, of very numerous, very delicate, antrorsely barbellate bristles; chromosome number $n = 17$ (*Raven & Breedlove 19906, King 3346*).

MEXICO: TAMAULIPAS: Sierra de San Carlos, La Vegonia, vicinity of San José, elev. 960 m, 5 Jul 1930, *Bartlett 10072* (GH, MICH).

VERACRUZ: Between Misantla and Naolinco, Aug 1912, *Purpus 6037* (GH); near Jalapa, 13 May 1900, *Pringle 9194* (GH); Orizaba, *Botteri 107* (GH), *Botteri & C. Mohr* in 1857 (US), *Botteri 366* in Oct 1854 (P).

OAXACA: Trapiche de la Concepción, *Liebmann,* Compos. Mex. 290 (GH, tracing ex herb. Klatt., probably this variety).

CHIAPAS: Mpio. Jitolol, elev. 2000 m, 28 Aug 1966, *Breedlove 15422;* Mpio. Pueblo Nuevo Solistahuacán, elev. 1620 m, 23–24 Jan 1965, *Raven & Breedlove 19906*; Mpio. Rayón, elev. 1830 m, 20 Aug 1965, *Breedlove 11990*; Mpio. San Cristóbal de las Casas, elev. 2130 m, 24 Aug 1964, *Breedlove 7093*; Mpio. Tenejapa, elev. 1200 m, 14 Jul 1964, *Breedlove 6431;* 25 Nov 1964, *Breedlove 7582* (DS), elev. 2250 m, 30 Sep 1965, *Breedlove 12557*, elev. 2700 m, 23 Aug 1966, *Breedlove 15259*; Mpio. de Teopisca, elev. 1770 m, 19 Aug 1966, *Breedlove 15041* (MICH, type); Mpio. de La Trinitaria, elev. 1560 m, 25 Nov 1964, *Breedlove 14989* (DS).

GUATEMALA: ALTA VERAPAZ: 9 mi W of San Cristóbal Verapaz, 13 Jul 1960, *R. M. King 3346* (MICH, NY); Cobán, elev. 1350 m, Mar 1908, *H. von Tuerckheim II 1285* (GH, US).

The Genus *Pinaropappus*

In 1951 L. H. Shinners published a new variety of *Pinaropappus roseus,* and at the same time listed the six accepted species of the genus to which the species belongs (Field & Lab. 19: 48). Two species, *P. parvus* Blake, and *P. multicaulis* Brandg., are restricted in range and morphologically distinctive (see map, Fig. 3). The others listed by Shinners, and the species newly described below, appear to be in need of further study. Apparently there are two principal species-groups, the one typified by *P. roseus*

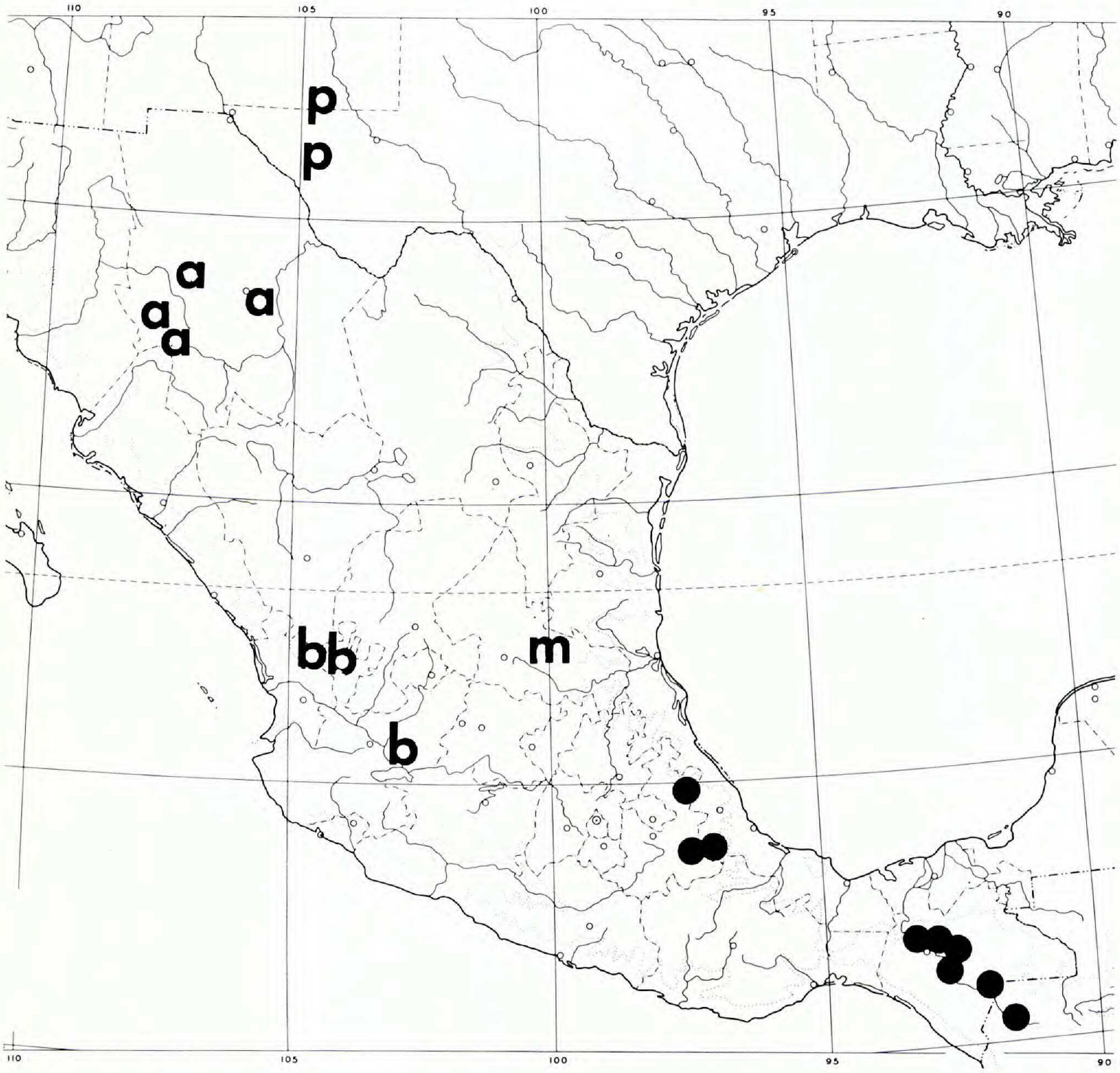

FIG. 3. Distribution of *Pinaropappus.* Solid circles represent *P. spathulatus.* a, *P. junceus.* b, *P. diguetii.* m, *P. multicaulis.* p, *P. parvus.*

(Less.) Less., and the other by *P. spathulatus* Brandg. The group of *P. roseus* is widespread from Texas and Arizona to Oaxaca (Fig. 5); on the basis of herbarium material it is obviously to be divided into several regional varieties. Probably members of the same complex, but here recognized as independent species, are *P. junceus* A. Gray (Chihuahua) and *P. diguetii* McVaugh (Jalisco and Nayarit). The group of *P. spathulatus* ranges from Puebla and Veracruz to Guatemala, and seems to comprise two regional varieties. The relationships between populations in this genus, and the inter- and intra-specific variation, merit experimental study beyond the scope of this paper. I have attempted merely to provide a synopsis in which three newly described taxa may be assigned places with their supposed relatives.

Key to the Principal Taxa

1. Phyllaries without broad scarious or black tips, sometimes purplish at the acute tip and with purplish midline; involucre less than 1 cm long; caespitose rock-plants of western Texas and adjacent New Mexico. *P. parvus.*

1. Phyllaries with broad, often deltoid or sagittate, scarious or blackish areas near the tips.

2. Leaves obovate-spatulate, entire, apparently coriaceous or fleshy, all in a basal rosette, 4–8 cm long, 1–2 cm wide; involucre 10–12 mm long, the middle phyllaries very broad and obtuse, ciliate-fringed, up to 3.5 mm wide and 6 mm long; saline areas, San Luis Potosí. *P. multicaulis.*

2. Leaves basal and cauline or, if all basal and entire, membranous and usually smaller; involucre about 1.5 cm long, or, if smaller, the middle phyllaries 1.5–2 mm wide, narrowed to an acute or obtuse tip.

3. Involucre about 15 (12–20) mm long; middle phyllaries oblong or tapering to the tips; tips of the middle and outer phyllaries mostly pale brown, variously ciliate-fringed or merely pubescent but not ciliate.

4. Middle phyllaries prevailingly oblong, 7–9 mm long, 2–3 mm wide; outermost phyllaries ovate or obovate, mostly 1.5–2 times as long as wide, 1.5–2.5 mm wide; phyllaries (except sometimes the narrow innermost ones) coarsely pubescent near tips but not finely ciliate; radical leaves usually present and pinnatifid-toothed; central and southern Mexico, widespread. *P. roseus* var. *roseus.*

4. Middle phyllaries prevailingly tapering to the tip from the base or from the middle; outermost phyllaries broad or narrow; tips of phyllaries sometimes finely ciliate; leaves various.

5. Middle phyllaries linear or narrowly tapering, 1.5–1.7 mm wide, 6–7.5 mm long, usually purple-blotched; tips not or scarcely ciliate; outermost phyllaries 0.9–1.2 mm wide, 2.5–3.3 times as long as wide; leaves narrowly linear, entire or the rosette-leaves toothed; arid areas, Zacatecas, San Luis Potosí and Nuevo León. *P. roseus* var. *maculatus.*

5. Middle phyllaries elliptic to rhomboid-obovate, if tapering from the base then mostly 2 mm wide or more; outermost phyllaries 1.5–3 mm wide, 1.5–2 times as long as wide (sometimes as wide as long); leaves various.

6. Middle phyllaries prevailingly elliptic, 1.8–2.8 mm wide and 3 (–4) times as long as wide; tips of the phyllaries not ciliate; outermost phyllaries 1.4–2 mm wide and usually about twice as long as wide; rosette-leaves usually pinnatifid, conspicuous at flowering time; cauline leaves often few or none; Texas, Nuevo León and Coahuila. *P. roseus* var.

6. Middle phyllaries prevailingly rhomboid-obovate, sometimes broadly elliptic, (2.5–) 3–4 mm wide; outermost phyllaries 2.3–3 mm wide, often almost as wide as long; cauline leaves usually several, broadly linear and entire; rosette-leaves inconspicuous or absent at flowering time; western Mexico.

7. Tips of the middle and inner phyllaries finely ciliate-fringed; flowers white; middle phyllaries erose, obtuse, about twice as long as wide; northern Jalisco and adjacent Nayarit. *P. diguetii.*

7. Tips of the phyllaries not ciliate-fringed; flowers pink; middle phyllaries very shortly cuspidate, 2.3–3 times as long as wide; northwestern Chihuahua, northeastern Sonora, and adjacent Arizona. *P. roseus* var. *foliosus.*

3. Involucre 9–13 mm long; middle phyllaries prevailingly tapering to the tips from the middle or sometimes from the base; tips of the middle and inner phyllaries usually finely ciliate-fringed, the discolored apical portions often black or nearly so; outermost phyllaries 0.6–1.2 mm wide, and usually 3–4 times as long.

8. Leaves narrowly linear or filiform, prevailingly cauline; western Chihuahua. *P. junceus.*
8. Leaves linear to spatulate, mostly basal, or basal and cauline; Veracruz to Central America.
    9. Middle phyllaries 1–1.5 mm wide, long-tapering or linear, 3–5 times as long as wide; acute inner phyllaries usually evidently prolonged beyond the middle and outer ones; Veracruz and Puebla. *P. spathulatus* var. *spathulatus.*
    9. Middle phyllaries 1.5–2.5 mm wide, prevailingly elliptic, 2.5–3.5 times as long as wide; inner phyllaries, except sometimes those resembling large paleae, not evidently prolonged; Chiapas and Guatemala. *P. spathulatus* var. *chiapensis.*

Pinaropappus diguetii McVaugh, sp. nov.

Herba perennis, caespitosa, glabra, subscaposa, caulibus striatis, pauciramosis, 30–60 cm altis; folia basalia ignota, caulinia linearia, integra, anguste acuta, 5–10 cm longa, 2–3.5 mm lata; folia superiora multo minora, bracteiformia, 2–10 mm longa; capitula solitaria, erecta, longe pedunculata; involucrum campanulatum, 1.5–2.2 cm longum; phyllaria 40–50, versus basin viridia, apicibus plumbeis sagittatis conspicuis; phyllaria media late elliptica vel rhomboidea, prope medium 3–4 mm lata, versus apicem obtusum vel subobtusum angustata; phyllariorum apices ciliato-fimbriati (pilis usque ad 0.5 mm longis), mox erosi et lacerati; bracteae sub involucrum 6–12, imbricatae, late ovatae vel irregulariter rotundae, 2–3 mm longae lataeque, basi carnosae, convexae, phyllariis exterioribus similes; flores circiter 70, albi, 2.2–2.5 cm longi, ligulis basi pilosis; antherae 5 mm longae; paleae scariosae, lanceolatae, longe attenuatae, ca 15 mm longae; achaenia matura ignota; pappus setis 11 mm longis capillaribus barbellatis, sordidis.

A deep-rooted perennial with multicipital caudex, the cauline leaves mostly in the lower third of the stem; the plant is easily recognized by the relatively large heads of white flowers, the broad elliptic phyllaries with ciliate lead-colored tips that are soon much frayed and broken, and the numerous broad imbricated accessory bracts with green and somewhat fleshy bases.

JALISCO: Near km 58, road from Zapotlanejo, ca 11 km west-northwest of Tototlán, elev. 1800 m, 24 Aug 1958, *McVaugh 17262* (MICH, type); Sierra de Nayarit, partie occidentale, *L. Diguet s.n.* (P, MICH). NAYARIT: Between Santa Gertrudis and Santa Teresa, 8 Aug 1897, *J. N. Rose 2094* (US).

Species in memoriam cel. Léon Diguet (1859–1926), cui debetur "Les Cactacées utiles du Mexique," nominavi.

Evidently akin to *P. roseus,* but differing from it by characters like those that distinguish *P. spathulatus* in eastern Mexico, *P. diguetii* is restricted as far as known to the high grasslands and adjacent mountains in northern Jalisco and Nayarit. It resembles *P. roseus* var. *foliosus* in habit and vegetative characters, and in the relatively large heads with broad elliptic to rhombic-obovate or even suborbicular phyllaries. *P. diguetii* shows to the greatest extent of any *Pinaropappus* the combination of stout stem with numerous cauline leaves; large and many-flowered heads; broad phyllaries that are widest at or near the middle, and green or whitish (not purple) below the discolored tips; outer phyllaries numerous and closely imbricated, pale and fleshy or convex at base, and broadly erose or lacerate at the broad tips. The flowers are white, the tips of the principal phyllaries are ciliate-fimbriate, and the discolored areas near the middle of the phyllaries tend to be lead color rather than brown. In *P. roseus* the flowers are never white as far as I know, the tips of the phyllaries are closely and coarsely short strigose but not at all or only very sparingly ciliate, the discolored tips of the phyllaries are usually pale or dark brown (sometimes with a narrow transverse black zone), and the phyllaries are usually purple or purplish below the discolored tips and not at all or scarcely thickened at base (except sometimes in var. *foliosus*).

Although the differences between *P. roseus* and *P. diguetii* are readily seen and demonstrated, the separation of the two taxa remains a somewhat subjective matter. Experimental investigation of the relationships between *P. roseus* var. *foliosus, P. diguetii,* and *P. roseus* var. *roseus,* might be most rewarding.

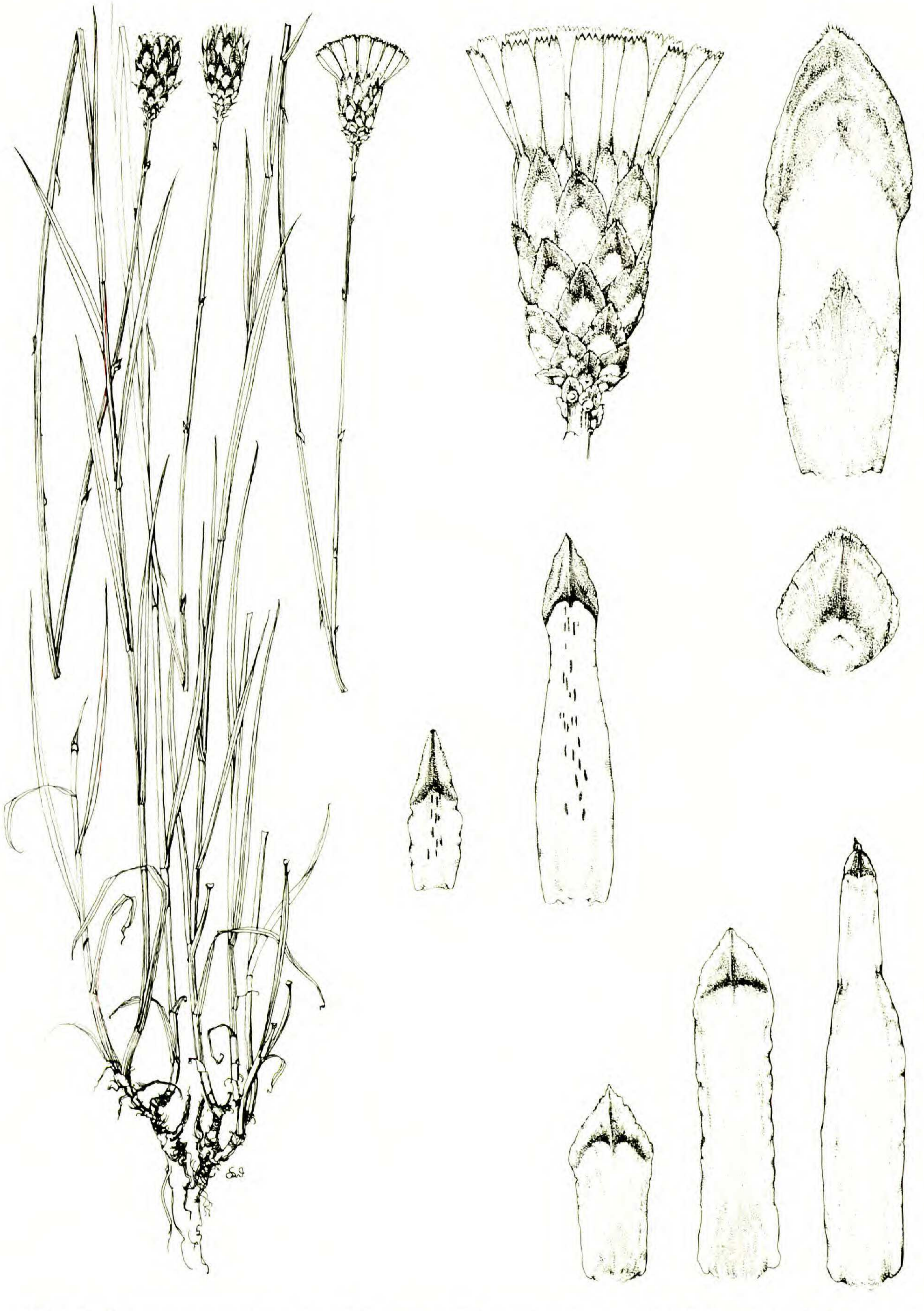

FIG. 4. *Pinaropappus diguetii* and *P. roseus.* Flowering plant, X ½ (*McVaugh 17262,* type of *P. diguetii*). Flowering head of *P. diguetii* (type), X ½. Middle and outer phyllaries of *P. diguetii* (type, upper right), *P. roseus* var. *maculatus* (*Shreve 9395,* type, at center), and *P. roseus* var. *roseus* (Jalisco, *McVaugh 16847,* lower right), all X 5.

Pinaropappus junceus A. Gray, Proc. Am. Acad. 22: 307. 1887.

Originally based on a collection by Pringle from the Mapula Mountains of Chihuahua, this name has been rather loosely applied to almost any very narrow-leaved *Pinaropappus* from western Mexico. In the protologue Gray emphasized the "subulate-setaceous" cauline leaves, and the small heads (said to be half as large as those of *P. roseus,* and with fewer flowers). I have not seen the type. The following, with small heads, very narrow and almost setaceous leaves, and narrow tapering phyllaries with ciliate tips, presumably represent *P. junceus,* which I take to be a very local species confined to western Chihuahua:

CHIHUAHUA: Mojárachic, elev. 2140 m, 10 Aug 1954, *Knobloch 1169*; Areponápuchic, Barranca de Urique, elev. 1000–1800 m, 23 Aug 1954, *Knobloch 1374.*

Pinaropappus roseus (Less.) Less. Syn. Gen. Comp. 143. 1832. *Achyrophorus roseus* Less. Linnaea 5: 133. 1830.

Originally described from Veracruz, *P. roseus* var. *roseus* is widespread and relatively uniform in the mountains of southern Mexico (see map, fig. 5). I have not seen the type; Lessing's original description of *Pinaropappus* (Syn: Gen. Comp. 143. 1832) emphasized the pinnatifid-dentate radical leaves and the characteristic tips of the phyllaries ("margine apicali latissime scariosis"), both of which presumably apply to what all later authors have called *P. roseus.*

The var. *roseus,* as I understand it, is at once recognized by the linear-oblong middle phyllaries which are usually not at all fringed at the tips, and by the pinnatifid-dentate basal leaves usually present at flowering time; the plants may be scapose or subscapose, but some narrow and usually entire cauline leaves are almost always present.

In Texas and northeastern Mexico almost all the specimens have somewhat elliptic or tapering phyllaries, but in vegetative characters and in other characters of the inflorescence, they are closely similar to specimens of var. *roseus.* These northeastern representatives of the species comprise a recognizably distinct population. I have not attempted to describe or name this Texano-Mexican variety because of the want of sufficient material for study. A few Texas specimens (e.g. *H. R. Reed s.n.,* from Roosevelt, Kimble Co.) are indistinguishable from Mexican material of var. *roseus.*

Another even more local regional population exists in the arid highlands from Zacatecas to Nuevo León. The plants are prevailingly small and scapose, 15 cm high or less, with narrow or linear and often pinnatifid-dentate basal leaves; the narrow phyllaries, which are usually irregularly blotched with small purple spots below the narrow blackish tips, are distinctive. This taxon may be characterized as follows:

Pinaropappus roseus (Less.) Less., var. **maculatus** McVaugh, var. nov.

Perennis, caespitosa, subscaposa, scapis unifloris 5–15 cm longis; a var. *roseo* phyllariis angustioribus, 1.5–1.7 mm latis, 6–7.5 mm longis, purpureo-maculatis, foliis perangustis differt.

ZACATECAS: Rocky slopes, base of Pico de Teyra, elev. ca 2000 m, 12 Sep 1939, *F. Shreve 9395* (MICH, type); slopes of Cerro Picacho about 8 km east of Chalchihuites, elev. 2500–3000 m, 14 Jul 1950, *Maysilles 7388;* 4 mi north of Zacatecas, eroded mountainsides, elev. ca. 2430 m, 24 Sep 1959, *Soderstrom 718.* SAN LUIS POTOSI: Charcas, 30 Jun 1934, *Lundell 5063.* NUEVO LEON: Mpio. de Galeana, San José de Raices, 1 Aug 1935, *Mueller 2324.*

In Arizona and adjacent Chihuahua and Sonora *Pinaropappus* is represented by *P. roseus* var. *foliosus* Shinners (Field & Lab. 19: 48. 1951), originally distinguished from var. *roseus* because the leaves are mostly cauline rather than basal, and are notably long and narrow. Rather a small number of specimens is available for study, but it seems that var. *foliosus* comprises a homogeneous population, differing in a number of ways from var. *roseus,* and in fact intermediate between var. *roseus* and the newly described *P. diguetii.* Var. *foliosus* has slightly larger heads than var. *roseus,* with broader phyllaries that tend to be elliptic to obovate rather than oblong. The principal phyllaries are cuspidate, a feature that is otherwise rare in this group of *Pinaropappus*, although seen in an occasional specimen throughout the range of var. *roseus*. The outer phyllaries and the bracts subtending the involucre are broader, more numerous and more conspicuous than those of var. *roseus*, with pale and often fleshy bases and often very broad and thin frayed margins.

The following are representative of var. *foliosus:*

ARIZONA: Huachuca Mountains, elev. ca 1800–2400 m, 5 Jul 1884, *Pringle s.n.* CHIHUAHUA: Sierra Charuco, Rancho Byerly, elev. ca 1500–1750 m, 17–25 Apr 1948, *Gentry 8093*; Colonia Garcia, elev. ca 2200 m, 4 Jun 1899, *Townsend & Barber 10* (US), 1–20 Aug 1899, *Nelson 6193* (US); Madera, elev. 2250 m, May–Jun 1908, *E. Palmer 316* (US); Canyon de Río San Miguel, 2 Jul 1891, *C. V. Hartman 720* (US). SONORA: Region of the Río de Bavispe, Jun–Aug 1940, *S. S. White 2844, 3191, 3445.*

Plants with the leaves mostly linear and cauline, i.e. in this respect like *P. diguetii* and *P. roseus* var. *foliosus*, but otherwise referable to *P. roseus* var. *roseus*, are not uncommon in the western part of the range of var. *roseus*. One specimen from northeastern Jalisco, near the type-locality of *P. diguetii*, exactly simulates plants of

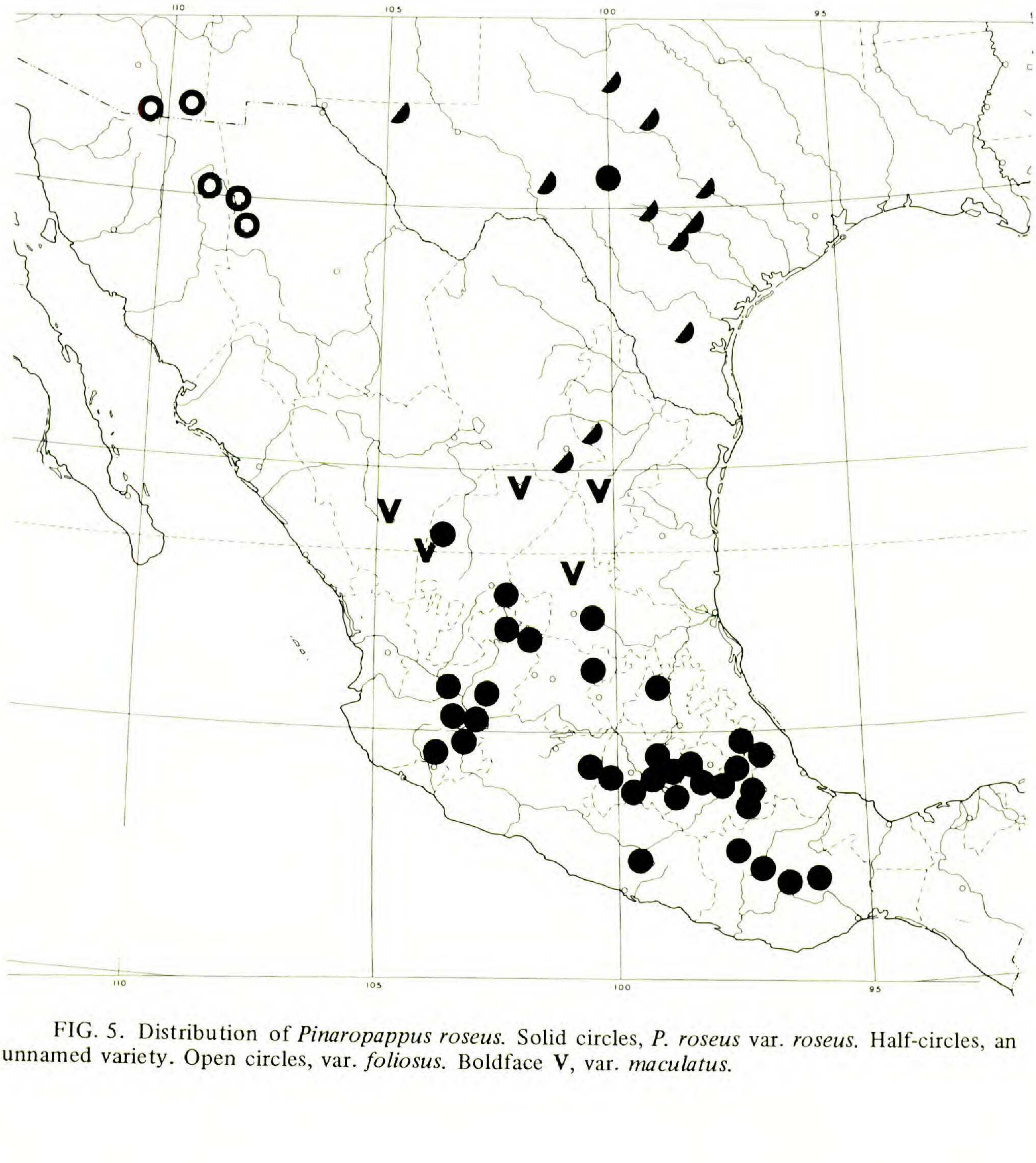

FIG. 5. Distribution of *Pinaropappus roseus*. Solid circles, *P. roseus* var. *roseus*. Half-circles, an unnamed variety. Open circles, var. *foliosus*. Boldface **V**, var. *maculatus*.

var. *foliosus* except that the phyllaries are not cuspidate (Cerro Gordo, southeast of Tepatitlán, *McVaugh 17512,* at MICH). It is tempting to speculate that plants with well-developed cauline leaves and few or no basal leaves may be primitive in this respect in this genus, and that the existing taxa in the mountains of western Mexico may have evolved from an ancestor with such leaves.

Pinaropappus spathulatus Brandg. Zoe 5: 241. 1906. *Pinaropappus caespitosus* Brandg. Univ. Calif. Publ. Bot. 4: 388. 1913.

These are plants with long narrow or spatulate and usually entire basal leaves, few cauline leaves and these usually very near the base, heads considerably smaller on the average than those of *P. roseus,* both inner and outer phyllaries narrow, and more tapering than those of *P. roseus,* with darker and usually ciliate-fringed tips. The group is regionally restricted, as far as known, to the Atlantic slope of Veracruz and Puebla, and to the highlands of Chiapas and Guatemala. In a genus like *Pinaropappus,* in which differences between species are nowhere very great, *P. spathulatus* is one of the more easily recognizable species. The type of *P. spathulatus* represents a local population with consistently narrow phyllaries. The type of *P. caespitosus* Brandg. (a name referred by Shinners to the synonymy of *P. spathulatus*) has somewhat broader phyllaries. I should agree with Shinners that *P. spathulatus* and *P. caespitosus* are synonymous; the type of the latter, however, came from Boca del Monte, near the border between Veracruz and Puebla, from an area where *P. roseus* in typical form is well known. If gene-exchange between *P. roseus* and *P. spathulatus* is possible, it seems not unlikely that "*P. caespitosus*" reflects this. The typical variety of *P. spathulatus* has apparently been little collected. I have seen only the following:

VERACRUZ: Orizaba, May 1905, *C. A. Purpus 1165* (UC, type), *C. Mohr s.n.* (US); Cofre de Perote, Sep 1866, *L. Hahn s.n.* (P). PUEBLA: Boca del Monte, Apr 1912, *Purpus 5816* (UC, type of *P. caespitosus*), Jun 1913, *Purpus 6407* (UC, US); "Puebla near Oaxaca," Sep 1909, *Purpus 4223* (UC).

The following variety has been collected in several localities in Chiapas and Guatemala in recent years. It is chiefly a plant of rocky or grassy slopes in forested mountains, often in full sun, with *Quercus, Pinus, Liquidambar* and other trees, at elevations from 1000 to 2500 meters. In aspect and in all vegetative and reproductive features it suggests *P. spathulatus* rather than *P. roseus.* In fact these Central American populations seem to differ from those of var. *spathulatus* chiefly in having somewhat larger, relatively broader and differently shaped phyllaries, and in the feature noted in the key, that in var. *spathulatus* the narrow inner phyllaries tend to be prolonged noticeably beyond the blunt outer phyllaries that form the base of the involucre.

Pinaropappus spathulatus Brandg., var. **chiapensis** McVaugh, var. nov.

Herba caespitosa, glabra, subscaposa, caulibus subsimplicibus 20–30 cm altis; folia integra vel sublobata, linearia, 5–12 cm longa, 1–3 mm lata, vel oblanceolata vel spathulata, vel latiora elliptica, 1 cm lata, petiolata; capitula solitaria, erecta, pedunculata; involucrum 8–13 mm longum, campanulatum, vix vel haud purpureum, phyllariis ca 40, ellipticis vel ovatis, prope medium latioribus 1.5–2.5 mm latis, apice obtusis vel rotundatis vel raro subacutis; phyllariorum apices plerumque ciliato-fimbriati; areae terminales fuscatae sagittatae, subnigrae; phyllaria exteriora, et bracteae paucae sub involucrum sitae, lanceolatae, 0.7–1.2 mm latae; flores 50–60, 1.5–2 cm longi; paleae 12–14 mm longae; achaenia subfusiformia, 6–7.5 mm longa, laevia vel versus apicem tenuem rostriformen scabrella, ca 15-costata; pappus setis capillaribus, sordidis, 6–7 mm longis, barbellatis.

CHIAPAS: Near San Cristóbal Las Casas, elev. ca 2100 m, 5 Jul 1964, *D. E. Breedlove 6011,* 11 Jun 1960, *R. M. King 2804* (MICH, type; US); Mpio. de Tenejapa, 4 Aug 1964, *Breedlove 6821,* 30 Sep 1965, *Breedlove 12526*; Mpio. de Tuxtla Gutiérrez, 29 Jan 1965, *Breedlove & Raven 20129*; Mpio. de Ixtapa, 14 Jun 1965, *Breedlove 10397*; Mpio. de Zinacantán, 1 Apr 1965, *Breedlove 9503*; Mpio. de La Trinitaria, 26 Jul 1965, *Breedlove 11309.*

GUATEMALA: HUEHUETENANGO: *Skutch 1027* (US); *Beaman 3946* (MSC); *King 3398* (MICH, US); *Breedlove 8666*; Todos Santos, elev. 2800 m, 10.6.1882, *Lehmann 1545* (US). QUICHE: San Sigudn, elev. ca 1750 m, Apr 1892, *Heyde & Lux (J. D. Sm. 3393)* (US).

Tribe III. Eupatorieae

Brickellia coulteri var. **megalodonta** (Greenm.) McVaugh, comb. nov. *Brickellia megalodonta* Greenm. Proc. Am. Acad. 40 [Contr. Gray Herb. II. 28] : 34. 1904.

Brickellia coulteri var. *coulteri* is a plant of the Sonoran desert and elsewhere in central and southwestern Arizona, Sonora and Baja California. Robinson's concept of *B. coulteri* included plants from as far east and southeast as Coahuila, Puebla, Aguascalientes and Colima. Most of the specimens from southwestern Mexico, however, seem to belong to another variety, which was treated by Robinson as an independent species. The differences between var. *megalodonta* and var. *coulteri* are not great. The leaves in var. *megalodonta,* on the average, are larger, with more prominent acuminate tips; the peduncles are a little longer and more delicate, the outer phyllaries a little narrower and fewer in number, and the herbage often pilose and less strongly stipitate-glandular. Robinson described the heads of *B. coulteri* as "ca. 17-floris," but this seems to be an extreme, not an average number; in specimens examined by Robinson himself (e.g. *Palmer 62* in 1887) the number of flowers varies from 12 to 15. The number of flowers in var. *megalodonta* is consistently about 12, whereas many individuals of var. *coulteri* have 15 or more flowers. I do not find consistent differences in corolla-length between the two varieties; although according to Robinson the corollas in var. *coulteri* are 8.2 mm long, I have not seen any longer than 7 mm; in var. *megalodonta* they are 6–6.5 mm long.

Brickellia extranea McVaugh, sp. nov.

Perennis, erecta, scabrida, e radice crassa lignosa, caulibus paucis foliosis usque ad 1 m altis, superne corymbo 6–15 cm longo terminata; folia rigidiuscula, alterna, subtus copiose globulifera, plusminusve triplinervia, mediana maxima, oblonga vel elliptica vel lanceolata, 5–7 cm longa, 0.7–1.8 cm lata, obtusa vel subacuta (apice brevicalloso), integra vel utroque latere 1–4-dentata, basi cuneatim producta, petiolo 3 mm longo vel breviore; folia superiora magnitudine decrescentia, lanceolata vel linearia, 2–4 cm longa; capitula 12–14 mm longa, 11–12-flora, erecta, subumbellatim disposita, pedunculis gracilibus 4–10 mm longis; involucrum 8–10 mm longum, campanulatum, phyllariis 3–5-seriatis, exterioribus gradatim brevioribus, valde 3–6-costatis; phyllaria interiora (ca 8) 7–9 mm longa, 1–1.5 mm lata, subglabra, inaequalia, oblonga vel elliptica, marginibus membranaceis, apicibus truncatis vel retusis, mucronatis; phyllaria media exterioraque (8–10) oblonga vel ovata, cuspidato-acuminata, pubescentia ciliataque; corolla glabra, viridula vel subpurpurascens, 6–7.5 mm longa, supra basin dilatatam fere linearis, lobis ovato-triangularibus 0.5–0.7 mm longis globuliferis; antherae prope corollae medium positae 1.5–1.8 mm longae, basi auriculatae, appendicibus ovatis 0.3 mm longis; styli ramuli 1–1.5 mm exserti; achaenia clavato-columnaria 3.5–3.8 mm longa, teretia vel compressa, saltem apicem versus appresse pubescentia, costulis 10 vel ultra convexis, confertis; pappi setae ca 20 albae, confertae, subplumosae 5.5–6.5 mm longae, barbulis inferioribus longioribus; receptaculum glabrum, per achaeniorum cicatrices asperatum.

JALISCO: Mpio. de Mezquitic, 5 km E of Rancho El Mortero, in pine-oak forest, elev. 2200 m, 5 Nov 1963, *Rzedowski 17698* (MICH, type); 8–10 km SE of El Mortero, elev. 2450 m, 5 Nov 1963, *Feddema 2449.*

Unknown except from the above collections, this species is superficially very like *Brickellia adenolepis,* with which it may be contrasted as follows:

1. Phyllaries 30–35, the outer ones usually bearing some dark, marginal, stipitate glands; pappus evidently plumose, the hairs on the bristles 0.2–0.4 mm long, more than twice as long as the thickness of the bristles. *B. adenolepis.*
1. Phyllaries 16–21, ciliate but eglandular; pappus barbed or subplumose, the hairs seldom as much as 0.2 mm long, hardly twice as long as the thickness of the bristles. *B. extranea.*

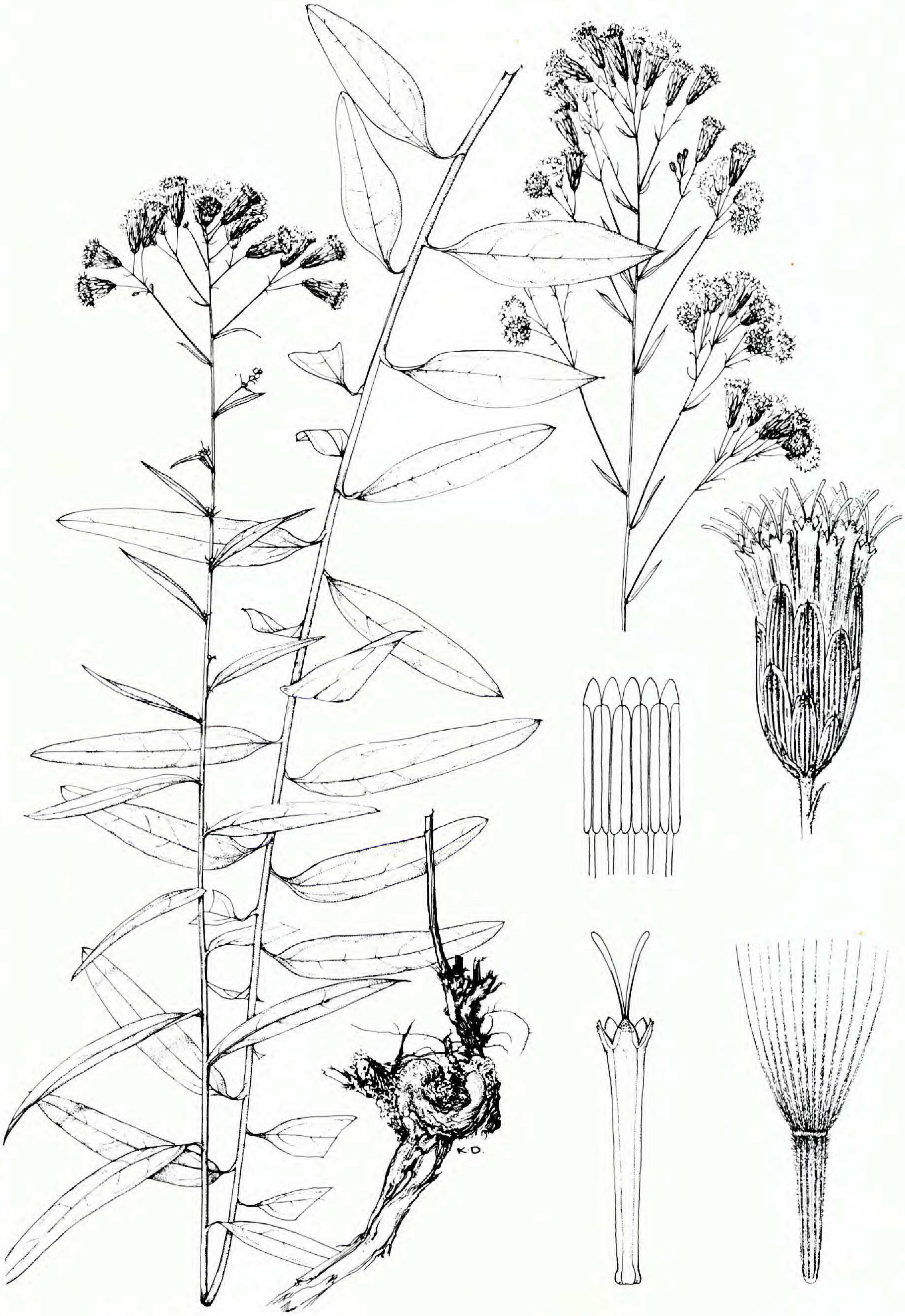

FIG. 6. *Brickellia extranea.* Flowering plant, ca X ½ (*Rzedowski 17698,* type). Inflorescence, ca X ½ (*Feddema 2449*). Head, ca X 3; corolla and achene, ca X 5; anthers, ca X 10 (all from the type).

Brickellia glandulosa (Llave) McVaugh, comb. nov. *Rosalesia glandulosa* La Llave in Ll. & Lex. Nov. Veg. Descr. 9. 1824. *Brickellia pacayensis* Coult. Bot. Gaz. 16: 98. 1891.

This is one of the easiest species of *Brickellia* to recognize, because of the large, oblong to obovate, densely glandular outer phyllaries. Robinson relegated *Rosalesia glandulosa* to the synonymy of *Brickellia squarrosa,* but a specimen from LaLlave's herbarium, bearing an original label "Rosalesia glandulosa Llave" is evidently the same plant that has been called *Brickellia pacayensis.* The specimen is now at Geneva (G) among the plants received from Lambert's herbarium, and marked by Lambert "Mexico Herb. La Llave." The specimen agrees well with the description in the protologue of *Rosalesia glandulosa,* where the "calix" was characterized as follows: "foliolis constat 8–12 acutis, erectis, aequalibus, striatis, ad medium usque duplici foliorum ordine cinctis, quae ovata sunt, apiceque revoluta; omnibus glanduloso viscosis." The type-locality was "in pascuis S. José del Corral," i.e. in the region of Córdoba, Veracruz.

Brickellia jaliscensis McVaugh, sp. nov.

Perennis, erecta, 0.6–1.25 m alta, habitu *Eupatorio dryophilo* persimilis, caulibus subsimplicibus, e caudice lignoso oriundis; caules, petioli pedunculique pubescentes, folia venis exceptis fere glabra, globulifera, rigide coriacea, subsessilia, late ovato-cordata, 2.5–5.5 cm longa, 2–5 cm lata, acuta vel apice pungenti et breve acuminato, vel infima obtusa, omnia 3(–5)-nervata, venulis in siccitate elevatis, reticulatis; petioli 1–3 (–6) mm longi; foliorum paria 10–15; inflorescentia paniculiformis paucicapitata 15–30 cm longa, ramis ascendentibus 5–10 cm longis, bracteatis, infimis exceptis alternis; capitula quoque ramo 1–7, erecta, late campanulata, 20–27-flora, 12–18 mm longa, pedunculis 1–2 (–4) cm longis suffulta; involucrum 10–14 mm longum, purpurascens, phyllariis 40–45, exterioribus gradatim brevioribus, abrupte pungentibus vel cuspidatis, ca 7-costulatis; phyllaria interiora ca 13, 2-seriata, 8–12 mm longa, 1–1.7 mm lata, late linearia vel elliptica, obtusa vel abrupte acuta, glabra sed ciliata, 2–4-costulata, marginibus membranaceis; flores flavidi, viriduli, vel ex purpureo viriduli; corollae glabrae, 8–9 mm longae, lineares, ca 0.5 mm diametro, distaliter parum angustatae, lobis ovatis 0.5 mm longis, globuliferis; antherae prope corollae medium positae, 1.5–2.2 mm longae, basi auriculatae, appendicibus ovatis 0.4–0.5 mm longis; styli ramuli 2–3 mm exserti, clavati, purpurascentes; achaenia clavato-columnaria, 3.3 mm longa, hirsuta pilis pallidis 0.5 mm longis, obtuse ca 10-costata; pappi setae 35–40 albae, crassae, barbellatae, 7–8.5 mm longae; receptaculum glabrum, per achaeniorum cicatrices cucullatas asperatum.

TYPE: JALISCO: In pine forest, mountains 20–25 km SSE of Autlán, 6–16 km above Ahuacapán, elev. 1500–2000 m, 22–23 Nov 1959, *McVaugh & Koelz 934* (MICH).

A species unlike most other Mexican Brickellias in appearance, and strongly reminiscent of *Eupatorium dryophilum* in the general habit, in the size and shape of the nearly sessile leaves, and the characters of the involucre.

Additional specimens examined:

ZACATECAS: Mountains ca 20 km W of the road-junction S of Jalpa, road to Tlaltenango, sheltered E-facing valley in oak forest, elev. 2500 m, 23 Dec 1970, *McVaugh 25629.*

AGUASCALIENTES: Sierra del Laurel, ca 16 km SE of Calvillo, 2000–2300 m, 4 Nov 1959, *McVaugh & Koelz 181.*

JALISCO: Cerro de Tequila, elev. 2560 m, 23 Dec 1967, *L. M. Villarreal de Puga 1070;* Talpa de Allende, Sierra de Cuale, 1800–2250 m, 19–21 Nov 1952, *McVaugh 14249;* Talpa, headwaters of Río de Talpa, 1200–1700 m, 23–25 Nov 1960, *McVaugh 21342;* Autlán, Sierra de Manantlán, south slope, 1700 m, 7 Nov 1952, *McVaugh 13979;* Tecalitlán, Sierra del Halo, 1700–1800 m, 3 Dec 1959, *McVaugh & Koelz 1378.*

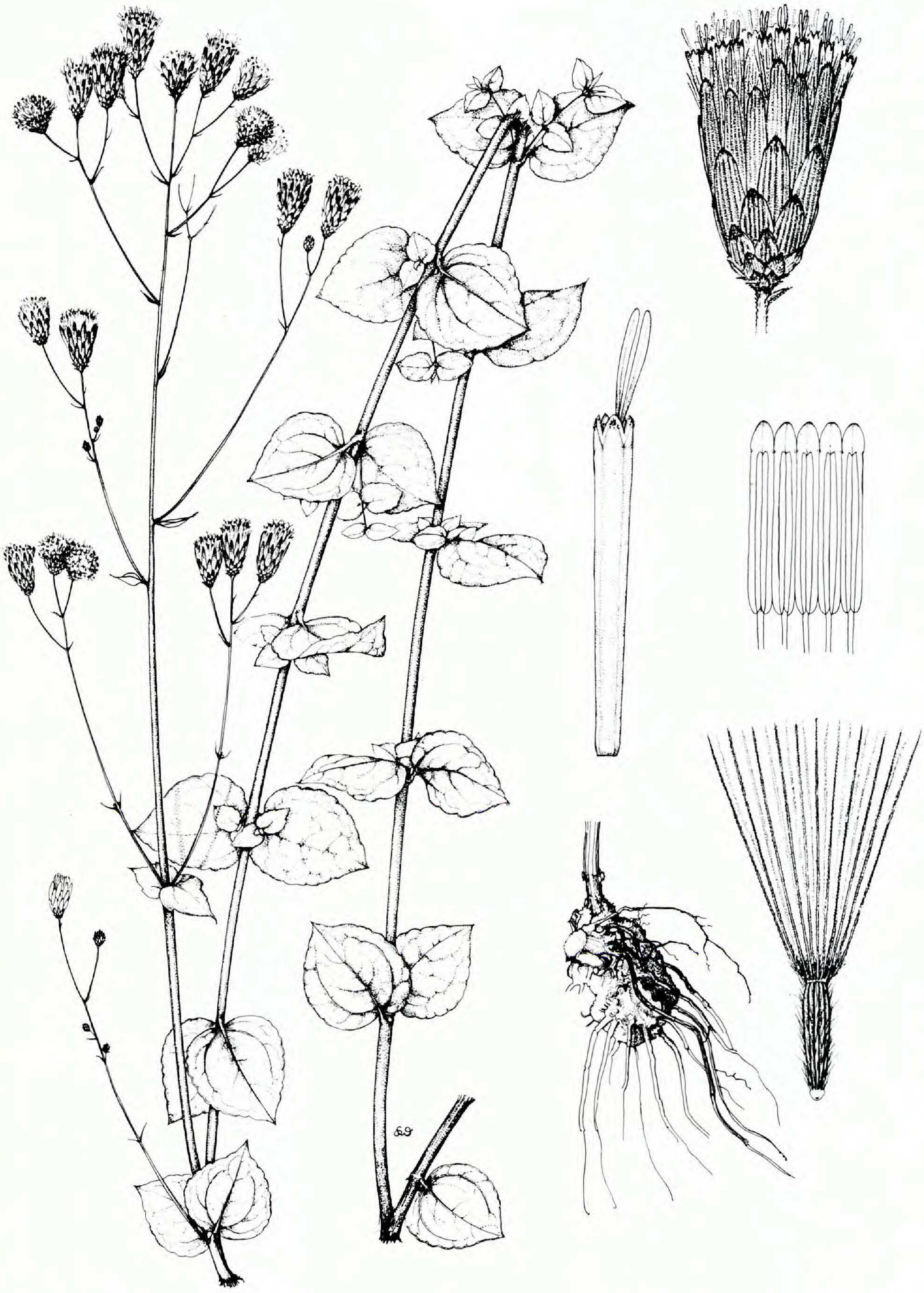

FIG. 7. *Brickellia jaliscensis* (*McVaugh & Koelz 934,* type). Flowering plant, X ½; head X 2; corolla and achene, X 5; anthers, X 10.

Brickellia magnifica McVaugh, sp. nov.

Frutex, vel basi praecipue lignosa, caulibus pluribus 2–2.5-metralis, arcuatis, capitulis cernuis; caules, pedunculi, petioli foliique venae pubescentes, phyllaria saltem exteriora fimbriato-ciliata, folia fere glabra et laevia, vel scabridula; folia opposita, ovata, principalia 8–17 cm longa, 5–10 cm lata, 3-nervata vel triplinervia, anguste acuminata, basi rotundata vel subcordata, et ibidem saepe cuneatim et aliquando inaequaliter in petiolos 2–4 (–7) cm longos producta; margines laterales utroque latere

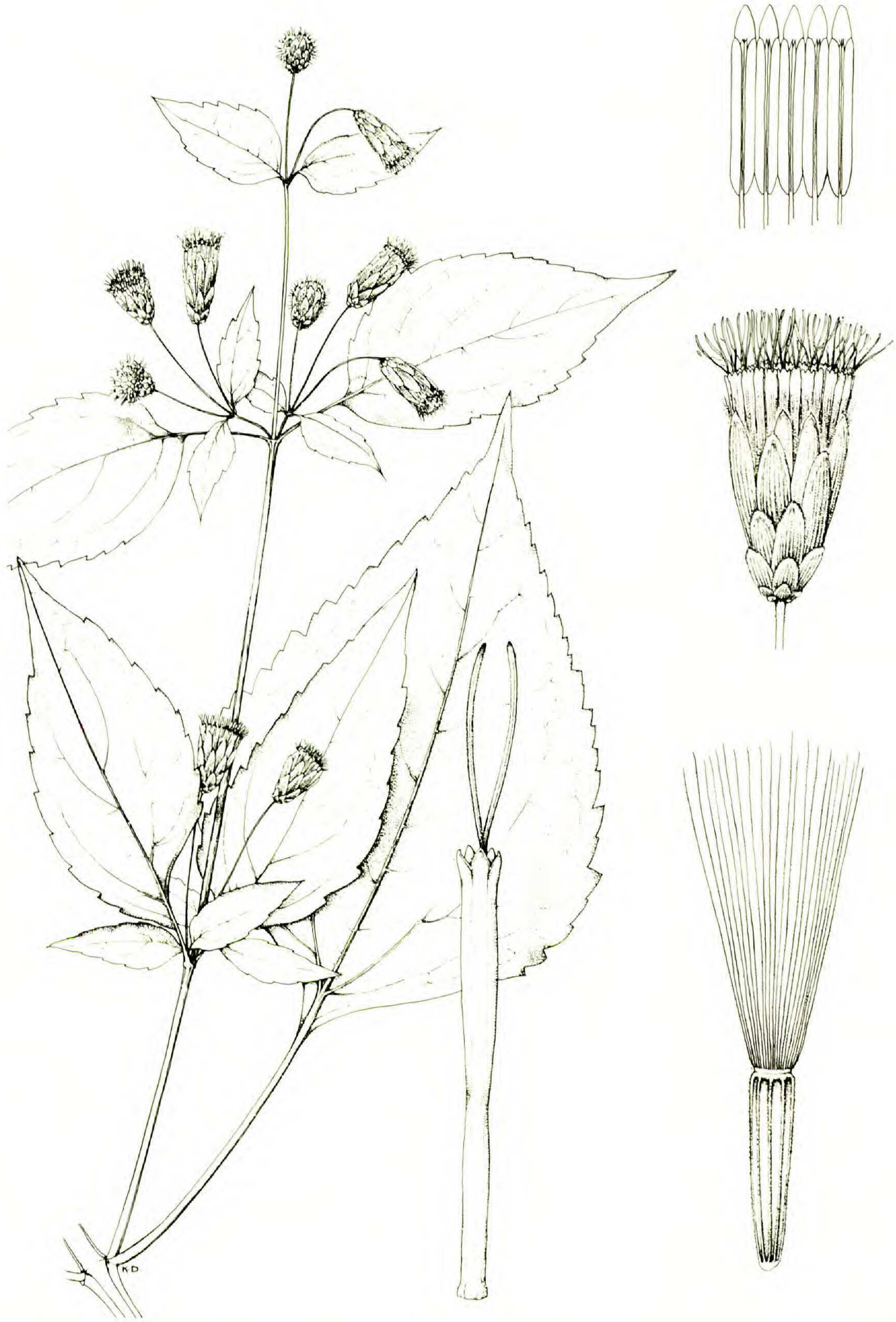

FIG. 8. *Brickellia magnifica* (*McVaugh 11737,* type). Main lateral branch of flowering inflorescence, X ½; head, X 1.5; corolla and achene, X 5; anthers X 7.5.

dentibus 10–20 grosse serratae; ramuli florentes oppositi, graciles, ascendentes, 15–30 cm longi, 2–4-nodi, capitulis quoque nodo vel nodo terminali 2–6, umbellatim dispositis, cernuis, pedunculis gracilissimis 2–3 cm longis; capitula campanulata 2–2.5 cm longa, 27–30-flora; involucrum 16–20 mm longum, viridi-stramineum vel ex purpureo viridulum, phyllariis tenuibus sed elasticis 25–35, exterioribus valde decrescentibus; phyllaria interiora 13–15, achaenia subtendentia, late linearia vel oblongo-elliptica, 15–18 mm longa, 1–3 mm lata, marginibus membranaceis, apicibus tenuibus, abrupte acutis; phyllaria exteriora ca 3-seriata, 5–9-costulata, obtusa et saepe apicibus fissa; extima minima ovata, acuta vel breve aristata; flores flaviduli vel ex purpureo flaviduli; corolla (9–) 11–12 mm longa, anguste linearis sed basi dilatata, lobis anguste triangularibus 0.7 mm longis; antherae 3 mm longae, basi auriculatae, appendicibus late ovatis 0.5 mm longis; styli ramuli flavidi, conspicui, ca 5 mm exserti, pro genere graciles, vix clavati; achaenia 4.5–5 mm longa, clavato-columnaria, pallide brunnea, fere glabra, ad angulos praecipue minute strigosa, costulis elevatis obtusis 9–10; pappi setae albae fragilissimae 40–50, 9 mm longae, minute barbellatae, subplumosae; receptaculum glabrum, per achaeniorum cicatrices multum asperatum.

JALISCO: Nevado de Colima, barranca in fir forest on the SE slopes, elev. 2700 m, 3 Apr 1951, *McVaugh 11737* (MICH, type); Nevado de Colima, *McVaugh 10018, 11660;* Autlán, Sierra de Manantlán, *McVaugh 10263.*

Among the shrubby species of *Brickellia* with opposite leaves, *B. magnifica* is unique in having large drooping heads, scanty non-glandular pubescence, long-petiolate leaves, obtuse or abruptly pointed (not taper-pointed) and essentially glabrous phyllaries, glabrous receptacle and nearly glabrous achenes. It is known only from densely wooded barrancas in fir or pine-fir forests, at elevations of 2400 to 2700 m, where it flowers in March and April.

Brickellia rapunculoides (DC.) McVaugh, comb. nov. *Stevia rapunculoides* DC. in DC. Prodr. 5: 124. 1836. *Eupatorium dasycarpum* A. Gray, Proc. Am. Acad. 22: 420. 1887. *Eupatorium rapunculoides* (DC.) Rob. Proc. Am. Acad. 42: 45. 1906.

When describing *Eupatorium dasycarpum,* Gray stated "The plant has the aspect, inflorescence, and involucre of a *Kuhnia,* or of some *Brickelliae.* The achenes are strongly pentangular, yet now and then with a secondary nerve on one or two of the faces." In the abundant material now available, the number of ribs on the achene usually varies from 6 to 8; it is occasionally as small as 5 or as large as 9. The plant is evidently out of place (on the basis of this one character) in both *Eupatorium* and *Brickellia.* In other respects, as noted by Gray, it seems closer to a number of species of *Brickellia.* It is similar, for example, to *B. amblyolepis* Rob., a species of Morelos and Guerrero. In the latter the achenes are mostly 10-ribbed; they are strigose and glandular as in *B. rapunculoides* and the inequality of the pappus-bristles is even more marked than in that species.

Brickellia secundiflora (Lag.) A. Gray, var. **monticola** McVaugh, var. nov.

A var. *secundiflora* pedunculis dense pilosis non glandulosis, a var. *nepetifolia* pedunculis non glandulosis, capitulis 20–30-floris non 10–19-floris differt.

JALISCO: Nevado de Colima, in oak-pine forest, SE slopes, elev. ca 2000 m, 4 Apr 1951, *McVaugh 11794* (MICH, type); pine forest 2–3 km E of Tapalpa, elev. 2100–2200 m, 30 Oct 1960, *McVaugh 20528;* above Amacueca, toward Tapalpa, in oak forest, 2100–2250 m, 2 Nov 1960, *McVaugh 20613A.*

MICHOACAN: Cerro Tancítaro, *Hinton 15695* (US); Cerro Patamban, *Nelson 6554* (US); 8 km S of Uruapan, elev. 1830 m, 11–15 Oct 1961, *King & Soderstrom 4763;* Zitácuaro to Mango, elev. 2000 m, 24 Oct 1938, *Hinton 13396.*

Typical *Brickellia secundiflora,* as interpreted by Robinson, is a viscid-glandular plant of eastern Mexico, known from the Valley of Mexico and thence northeastward and southeastward. In Nueva Galicia the species is represented chiefly by the var. *nepetifolia* (H.B.K.) Rob., which ranges from western and southern Durango to

Zacatecas, Aguascalientes, central and northern Jalisco, Guanajuato (Santa Rosa, *Humboldt & Bonpland!*, the type) and Michoacán. In this variety the stipitate glands are usually confined to the peduncles where they are relatively inconspicuous among the long eglandular hairs. The flowers are usually 12–15 (sometimes as few as 10 or as many as 19) in a head.

The var. *monticola* apparently occupies a somewhat more southerly range than that of var. *nepetifolia*, and is found, on the average, in higher and more humid situations. The branches, foliage and peduncles are hirsute, nearly or quite without stipitate glands; the leaves are mostly broadly ovate-cordate, 5-10 cm long; the flowers are 20–30 in a head.

Carminatia recondita McVaugh, sp. nov.

Annua, erecta, foliis oppositis; foliorum paria 5–8, plerumque plantae infra medium posita; folia late ovata, petiolata, palmatim 3(–5)-nervata, serrulata vel dentata; capitula (in spica elongata disposita) subcylindrica ca 11-flora, phyllariis ca 20, exterioribus gradatim brevioribus, intimis 8 subaequalibus, angustis, acutis; corolla viridula, anguste tubiformis; antherae pallidae, inclusae, basi acutae vel obtusae, apice appendiculatae; styli ramuli filiformes, 1–1.5 mm exserti; achaenia sublinearia, ca 5-angulata; pappi setae 9–13 albae, basi coalitae, plumosae, quam corollae paullo breviores; cum specie altera (*C. tenuiflora*) in characteribus supra dictis bene congruens, aliis differt:

1. Corolla anguste linearis vel apicem versus angustata, (5.5–) 6–7 (–7.5) mm longa, complanata minus quam 0.5 mm lata; antherae, appendicibus inclusis, 0.7–0.8 mm longae; achaenia 4–5.3 mm longa, apice glabra truncataque, pappo sessili; involucrum 11–13.5 mm longum; spica plerumque breve pedunculata, pedunculo 5–15 cm longo, saepe spicae tertiam partem aequanti; spica plerumque non secunda, capitulis sub anthesi saepe ascendentibus. *C. tenuiflora.*

1. Corolla apicem versus manifeste dilatata, 7.5–9 mm longa, complanata 0.7–1 mm lata; antherae, appendicibus inclusis, 1.1–1.4 mm longae; achaenia 5.5–7 mm longae, ad apicem sub pappo in collum brevem pilosum contracta; involucrum 14–17.5 mm longum; spica plerumque longe pedunculata, pedunculo 10–30 cm longo, spicam saepe aequanti (pedunculi brevissimi spica 2-plo breviores, longissimi spica sesquilongiores); spica saepe secunda, capitulis sub anthesi patentibus vel cernuis. *C. recondita.*

NAYARIT: 16 km SE of Ahuacatlán, road to Barranca del Oro, precipitous rocky S-facing slopes, wooded ravine, elev. 1100–1300 m, 17–18 Nov 1959, *McVaugh & Koelz 804* (MICH, type); NW of Ahuacatlán, *Cronquist 9601;* N of Compostela, *McVaugh & Koelz 511.*

JALISCO: La Cuesta, Mpio. Talpa de Allende, elev. 800 m, *McVaugh 21135;* Mpio. de Tecalitlán, 15 km E of Pihuamo, *Feddema 2203;* Barranca de Beltrán, NE of Tonila, *McVaugh 24957*; Barranca del Río Santiago [near Guadalajara], *Diguet 86.*

COLIMA: Along Río Salado, 8 km S of Colima, elev. 400 m, *McVaugh & Koelz 1102;* Alzada, 4 Nov 1910, *Orcutt 4655* (GH).

MICHOACAN: 22 km N of Buenavista Tomatlán, *McVaugh 24782;* 35 km S of Jiquilpan, *King & Soderstrom 4600*; 3 km below Tacámbaro, elev. 1520 m, *Moore et al. 5603*; Mpio. de Chinicuila, Villa Victoria, 1200 m, 15 Nov 1938, *Hinton 12567* (GH).

OAXACA: 9 mi SE of Tapanatepec, *Breedlove & Raven 13703.*

CHIAPAS: Mpio. de Tuxtla Gutiérrez, *Breedlove & Raven 13346, 13498;* Mpio. de Ixtapa, *Breedlove 13826;* 3 mi W of Los Amates, E of Chiapas-Oaxaca border, *Cronquist 9667.*

This newly described species is a plant of the Pacific slope of western Mexico, growing mostly at elevations between 400 and 1500 m, from southern Nayarit to the coastal mountains of Jalisco, Colima, and Michoacán. What seems to the the same species occurs in Oaxaca and Chiapas. The first-known species of the genus, *C. tenuiflora* DC., is found primarily in the interior uplands of western Mexico, ranging from southern Arizona and the cape region of Baja California to Jalisco, Guanajuato, Michoacán, Edo. de México, Hidalgo and Guerrero. The type (*Méndez* in herb. G-DC.!) was from León, Guanajuato.

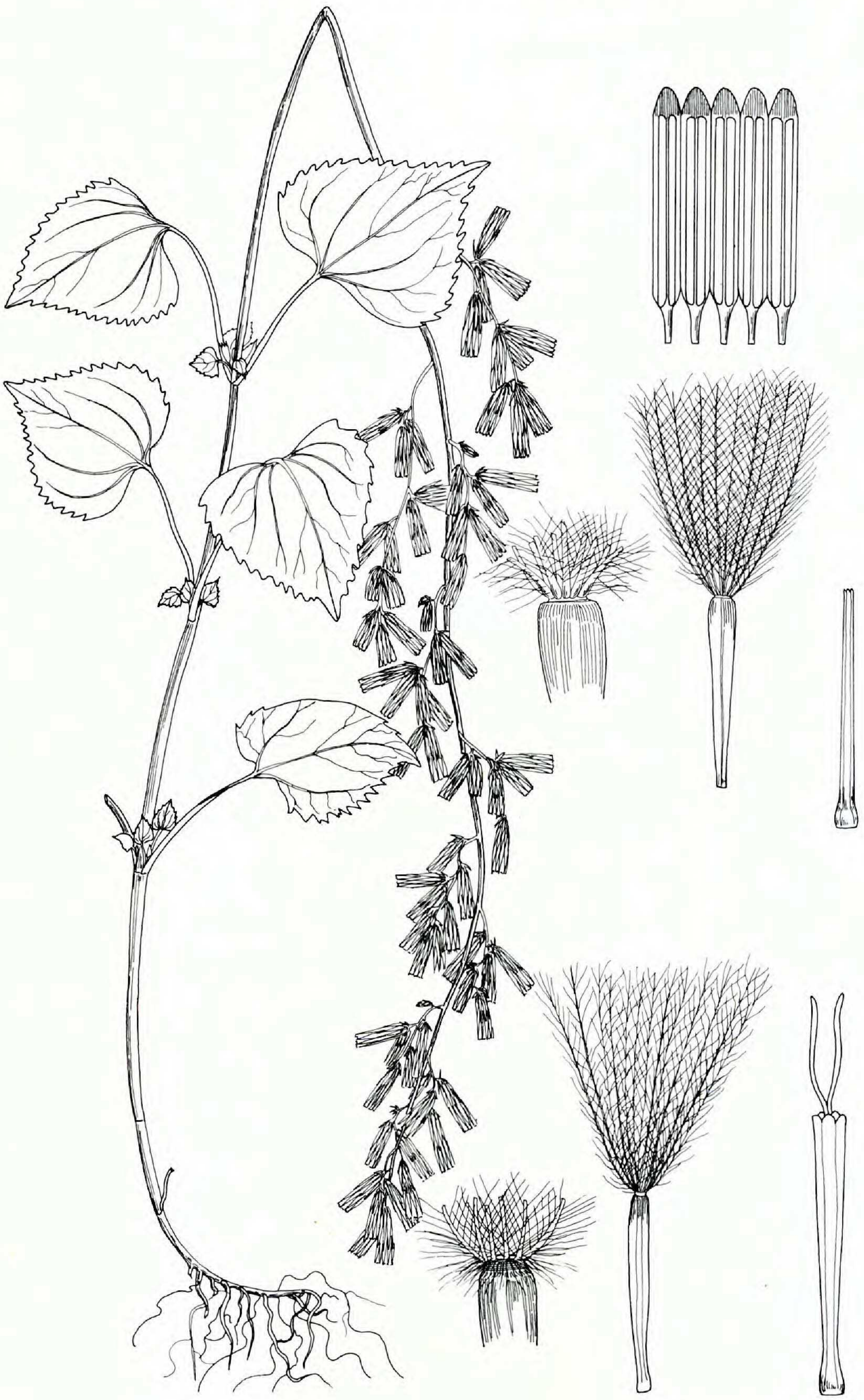

FIG. 9. *Carminatia.* Flowering plant of *C. tenuiflora*, ca X 7/16 (*McVaugh 19527*); anthers, ca X 25; corolla and achene, ca X 4.5; part of achene and base of pappus, ca X 11. Lower right, *C. recondita* (*McVaugh & Koelz 804*, type). Corolla and achene, ca X 4.5; part of achene and base of pappus, ca X 11. Drawn by Humberto Sánchez Córdova.

Carphochaete gummifera McVaugh, sp. nov.

Fruticulus glaber et gummosus, resinoso-punctatus, ramulis hornotinis 20–40 cm altis; folia in axillis prolificantia, anguste linearia, 2.5–5 cm longa, 1.3–2.5 mm lata, obtusa, carnosiuscula, plano-convexa vel supra sulcata, 0.5–0.8 mm crassa; internodi

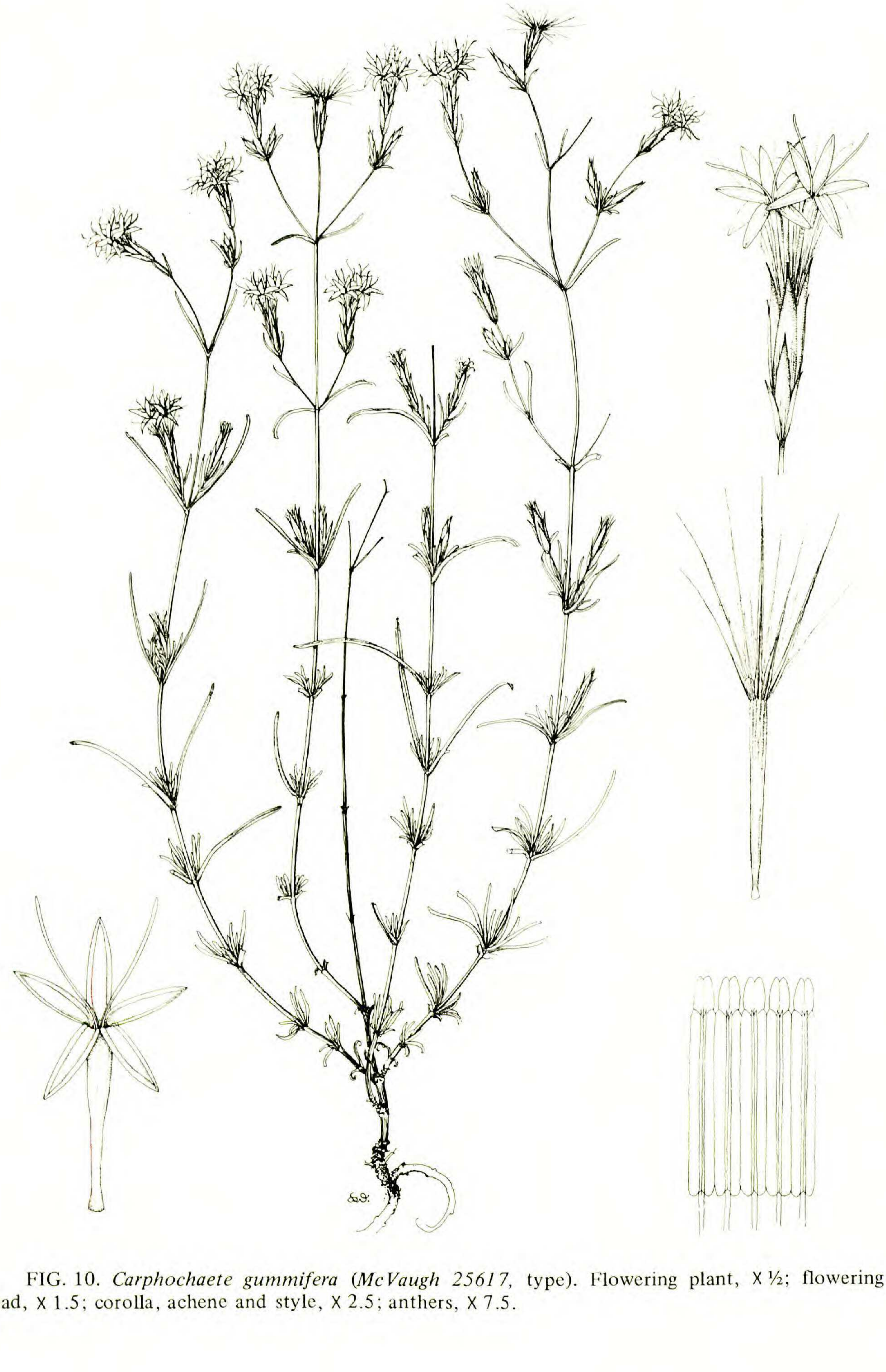

FIG. 10. *Carphochaete gummifera* (*McVaugh 25617,* type). Flowering plant, X ½; flowering head, X 1.5; corolla, achene and style, X 2.5; anthers, X 7.5.

superiores plerumque elongati, caulis pars superior inflorescentiam laxam paniculiformem formans; capitula pauca, 2.5–3 cm longa, nunc in axillis superioribus sessilia vel brevipedunculata, nunc pedunculata, terminalia, solitaria vel quoque ramo 2–3, pedunculis ad 2.5 cm longis; inflorescentiae bracteae 2 cm longae vel breviores, forma foliis caulinibus similes; involucrum subcylindricum (in alabastro fusiforme), 15–16 mm longum, ca 3 mm crassum, phyllariis 7–10, lanceolato-linearibus vel elliptico-linearibus, acutis vel attenuatis, apicibus angustis pungentibus, marginibus plerumque angustis hyalinis, interdum glanduloso-ciliatis; phyllaria intima 4 (flores subtendentia), ca 2 mm lata; phyllaria exteriora plerumque paria 2 decussata 6–12 mm longa formantia; flores lilacini; corolla 16–17 mm longa, glabra, tubo longo tenui in faucem brevem infundibuliformem sensim ampliato, lobis 5 ellipticis acutis 4.5–5 mm longis, 1.5–1.8 mm latis; antherae 3.5 mm longae, basi subauriculatae, appendicibus obtusis, oblongis, 0.6 mm longis; styli ramuli ca 10 mm longi, exserti; achaenia 10–11 mm longa, subteretia, apice 0.7 mm crassa, strigosa, ad basin callosam sensim angustata; pappus biseriatus, aristis attenuatis planis inaequalibus 7–10, (7–) 11–12 mm longis, hyalino-marginatis, et squamulis hyalinis exterioribus 1–3, 1.5 mm longis.

ZACATECAS: Grassy openings in oak forest, steep slopes near the summits of the mountains between Jalpa and Tlaltenango, elev. 2300–2500 m, 22 Dec 1970, *McVaugh 25617* (MICH, type). Known only from the type-collection.

This species superficially resembles *Carphochaete grahamii* A. Gray, which is widespread in the Central Plateau of Mexico and the adjacent mountains, from Durango to the State of Mexico. *C. grahamii* differs most obviously in having the phyllaries long-pilose at least near the tips, which are cuspidate rather than merely acute or attenuate; and in having flat leaves which are mostly broader than linear, 2–5 mm wide or more. The gummy exudate that is characteristic of *C. gummifera* is sparingly if at all developed in *C. grahamii.*

Eupatorium

1. The Species of *"Eupatoriastrum."*

The genus *Eupatoriastrum,* as originally described by Greenman (Proc. Am. Acad. 39 [Contr. Gray Herb. II. 25]: 93. 1903), included but one species, *E. nelsonii.* Because of the eupatorioid styles Greenman placed the new genus "provisionally" near *Eupatorium,* from which he distinguished it by the uniformly chaffy receptacle. Twenty years later Robinson (Contr. Gray Herb. II. 68: 34. 1923) referred a second species to *Eupatoriastrum,* saying of this second species and of *E. nelsonii* "neither of these coarse herbs with loose inflorescence of large heads and with copiously paleaceous receptable possesses close resemblance or shows near approach to any undoubted species of *Eupatorium.*" Fifteen years after this Blake (Jour. Wash. Acad. 28: 479. 1938) described a third species, *Eupatoriastrum opadoclinium.* Of this Blake commented as follows:

"In external appearance this is very similar to the section *Cylindrocephala* of *Eupatorium* and utterly distinct from the two species of *Eupatoriastrum* hitherto known, [but] . . . every flower in the head is subtended by a pale, and it is necessary to refer the species to *Eupatoriastrum* or to suppress the latter genus, a course which seems unjustified." Blake pointed out further that the new species, "in the texture and convexity of its phyllaries," was very similar to the species of the Brazilian section *Chromolaena* of *Eupatorium* "which makes a definite approach to *Eupatoriastrum* in having the receptacle paleaceous here and there but never, apparently, throughout as in *Eupatoriastrum.*"

Now the discovery of a fourth species with the characters of *Eupatorium* but with paleaceous receptacle makes it desirable to consider again the standing of *Eupatoriastrum* as a genus. Apparently there is nothing to mark the genus except the presence, throughout the receptacle, of narrow scarious pales about as long as the flowers. This in itself is not a very good generic character unless it be correlated with others. As noted above, some other species that are "undoubted species of *Eupatorium*" have the receptacle partly paleaceous. In the related genus *Ageratum* botanists have generally recognized a series of species with receptacle naked, and another series with receptacle paleaceous. In some eupatorioid species (e.g. in *Eupatorium polybotryum* DC.) there is a tendency for the innermost phyllaries to be transformed into pales. In others (e.g. *E. altiscandens,* sect. *Hebeclinium*), the heads are relatively few-flowered, but almost every flower is subtended by a pale. It would seem that in various eupatorioid lines the paleaceous receptacle has developed, or perhaps more probably has persisted through evolutionary change.

If it were possible to show that *Eupatoriastrum* comprised a homogeneous group, united by several characters in common, then perhaps it should be recognized. The four known species, however, seem to represent several evolutionary lines. As Blake stated, *E. opadoclinium* bears a strong superficial resemblance to the section *Cylindrocephala* (e.g. to such species as *Eupatorium oerstedianum, E. ovaliflorum, E. glaberrimum,* etc.). The other three species bear a strong habital resemblance to one another, but differ in other ways. The pappus in *E. triangulare,* for example, consists of numerous, closely packed, coarse and persistent bristles; in *E. nelsonii* and in the new species described below the bristles are less numerous, rather widely spaced, delicate and soon deciduous. These differences correspond to those that mark different series of species in *Eupatorium,* but they do not suggest close relationship between *E. triangulare* and the other two species. Furthermore the anthers in the new species are quite typical of those in *Eupatorium;* the appendages are thin, flat, oblong obtuse scales projecting well beyond the tips of the anthers; in *E. nelsonii* the appendages are present but short and slightly thickened and spreading; in *E. triangulare* the tips of the anthers are essentially exappendiculate, thickened and recurved, almost truncate, as in the supposed genus *Ophryosporus.* Perhaps these anther differences mark an evolutionary series, but they do not provide convincing evidence of generic independence. Similar series may be found in other species-groups in *Eupatorium.* Although *Eupatoriastrum* offers a convenient pigeonhole for the filing of any species of *Eupatorium* with paleaceous receptacle, it does not seem to constitute a natural evolutionary group.

The following synopsis contrasts the four species discussed above:

1. Leaves sessile and subcordate, lanceolate, 2–5 cm wide; involucre campanulate-cylindric; Chiapas. [*Eupatoriastrum opadoclinium* Blake, Jour. Wash. Acad. 28: 479. 1938]. **Eupatorium opadoclinium** (Blake) McVaugh, comb. nov.
1. Leaves evidently slender-petiolate, ovate, deltoid or suborbicular, mostly 10–25 cm wide; involucre campanulate or hemispheric or the phyllaries almost rotate.
   2. Leaves ovate, rounded at base; panicle-branches and phyllaries eglandular; Chiapas. [*Eupatoriastrum nelsonii* Greenm. Proc. Am. Acad. 39: 93. 1903]. Not *Eupatorium nelsonii* Rob. **Eupatorium ultraisthmium** McVaugh, nom. nov.
   2. Leaves cordate, mostly deltoid or suborbicular; panicle-branches and phyllaries glandular.
      3. Heads subtended by 15-20 loosely spreading, narrow, attenuate, copiously glandular, foliaceous bracts 1–2 cm long, longer than or about equalling the phyllaries; phyllaries 75–100 or more, subequal, similar to the bracts; pappus delicate, the 15-20 bristles soon deciduous; anthers (1.6–) 2.2 mm long with flat blunt appendages 0.3–0.5 mm long; Chiapas. **Eupatorium corvi** McVaugh, sp. nov.
      3. Heads not involucrate, the 25–40 phyllaries evidently graduated in length, not foliaceous, the outermost glandular on the backs, the inner ones nearly smooth; pappus persistent on the achenes, consisting of about 40 coarse bristles; anthers 1.5–1.7 mm long, truncate, essentially exappendiculate, with thickened outcurled tips; Nayarit to Oaxaca. [*Eupatoriastrum triangulare* (DC.) Rob.]. *Eupatorium vitifolium* Klatt.

Eupatorium corvi McVaugh, sp. nov.

Herba (ut videtur) grossa usque ad 2-metralis, copiose glanduloso-pubescens; folia asperiuscula, late ovato-cordata vel suborbicularia, 7–15-dentato-lobata, basi palmatim (5–) 7-nervata, caulinia (12–) 20–30 cm long, (12–) 20–25 cm lata, lobulis terminalibus majoribus, deltoideo-acuminatis, 3–6 cm longis latisque; lamina basi cordata, marginibus denticulatis, petiolis 2–8 cm longis; panicula terminalis diffusa usque ad 50 cm longa vel ultra, capitulis magnis paucis, ca 200-floris, usque ad 2 cm longis, 3 cm latis, longe pedunculatis, basi bracteatis, bracteis 15–20 appressis attenuatis foliaceis 1–2 cm longis, 1.5–3 mm latis suffultis; phyllaria 100–125, lanceolata, 10–12 mm longa, subaequalia, basi curvata rigidaque, apicibus foliaceis, attenuatis, glandulosis, patentibus; corolla 5.5–7 mm longa, sublinearis; antherae 1.8–2.2 mm longae, appendicibus *Eupatorii* modo terminatae; styli rami filiformes; achaenia 2.5 mm longa, strigosa, 5-angulata; pappi setae 15–20 fragiles, deciduae; receptaculum paleaceum, paleis scariosis, perangustis, attenuatis, 1 cm longis.

Species botanico indefesso Peter Hamilton Raven (1936–), qui mecum humanissime plantas siccas chiapenses communicavit, nominavi.

Probably a coarse herb, copiously glandular pubescent, with loosely flowered terminal panicle; upper stems and panicle-branches, petioles and veins of the lower leaf-surface pilose with flaccid pale multicellular hairs which are prevailingly eglandular on the leaves, gland-tipped in the panicles; phyllaries and involucre-like bracts densely glandular; herbage abundantly resinous-dotted; leaves at maturity rough-pubescent on both sides, broadly ovate-cordate to suborbicular, palmately (5–) 7-veined at base, those in the panicle about 10 cm long, the larger ones 20–30 cm long and 20–25 cm wide, with 7–15 small deltoid lobes, the terminal lobes deltoid-acuminate, 4–6 cm long and wide, slightly larger than the adjacent lateral ones; base cordate with rather narrow sinus; margins concave between the lobes, and sharply denticulate; panicles with ascending branches up to 20–40 cm long, compound, alternately branched, leafy-bracteate, bearing few large heads (up to 2 cm long and 3 cm wide) on naked or bracteate peduncles (1.5–) 3–9 cm long and about 1 mm thick; flowers recorded as "orange" or "white"; involucre in anthesis broadly bowl-shaped, up to 1.5 cm high and 2.5 cm wide, subtended at base by 15-20 appressed or loosely spreading lanceolate attenuate bracts that are a little larger than but otherwise indistinguishable from the other phyllaries (except by position), and merge imperceptibly with the phyllaries; phyllaries all about the same length, lanceolate, 1.5 mm wide or less, their curved rigid overlapping bases forming the cuplike base of the involucre, their attenuate, foliaceous, veiny and copiously glandular tips spreading or loosely reflexed; corolla very narrowly tubular-funnelform, almost linear, the triangular lobes 0.5 mm long; anthers narrowly auriculate at base, the oblong-ovate blunt appendages 0.3–0.5 mm long; style-branches exserted 5 mm or more; achenes columnar-clavate, 5-angled, nearly black, strigose above and at the callose base; pappus-bristles white, 6–7 mm long, widely separated, barbellate, coarse but very fragile, deciduous before the achenes; receptacle paleaceous, the pales scarious, flat, very narrowly linear with attenuate barbellate tip, 1 cm long, 0.2–0.3 mm wide, or the central ones almost filiform.

MEXICO: CHIAPAS: Mpio. de Venustiano Carranza: Above Finca Carmen, road from Acala to Pugiltik, 540 m, 3 Oct 1967, *Alush Shilom Ton 3029;* Rancho Nacimiento, between Chiapilla and San Lucas, wooded slope, elev. 600 m, 25 Feb 1966, *Laughlin 284* (MICH, type). Mpio. de Chiapa de Corzo: El Chorreadero, ca 9 km east of Chiapa de Corzo, elev. 750 m, 18 Oct 1965, *Breedlove & Raven 13473;* 28 Nov 1967, *Ton 3252.*

A recent collection from an area 60–70 km north of the original localities probably represents the same taxon, but the heads and flowers are smaller. The plant is a weak shrub or woody herb growing on limestone cliffs, the stems 40–60 cm high from a short fleshy-rooted caudex; the heads are about 1.5–2 cm high, the outer bracts 1–1.5 cm long, 1–2.5 mm wide, the phyllaries 70–100, the anthers 1.6 mm long, the appendages 0.3–0.4 mm long; achenes 3 mm long.

CHIAPAS: Mpio. de Ixhuatán, north of Ixhuatán, elev. 430 m, 22 Jan 1970, *Anderson & Anderson 5530.*

2. *Eupatorium* in Nueva Galicia.

Eupatorium altiscandens McVaugh, sp. nov.

Frutex, flexuoso-scandens, basi diametro ad 3–4 cm, inflorescentia excepta glaber; folia opposita vel interdum ternata, carnosula, lanceolata vel elliptica, integra, 10–17 cm longa, 3–5 cm lata, (2–) 3–4-plo longiora quam latiora, apice acuta, basi rotundata vel acuta, venis pinnatis arcuato-ascendentibus quoque latere 3–5, marginibus in petiolos 4–5 cm longos cuneatim decurrentibus; inflorescentia terminalis, 5–7 cm longa, paria ramorum lateralium 2–3, 3–4 cm longa; paniculae ramuli pedunculique dense pilis brunneis appressis pubescentes; capitula ut videtur 30 vel ultra, pedunculis bracteatis ad 5–10 cm longis; phyllaria ca 13, oblonga vel late elliptica vel obovata, marginibus saltem apices obtusos vel subacutos versus erosis; phyllaria interiora ca 5–9, 3 mm longa, 1 mm lata, vetustate paullo reflexa et extrinsecus plicata; phyllaria exteriora gradatim breviora, plusminusve biseriata; flores 16–18; corolla (in statu vivo ignota) ca 7 mm longa, tubi apicem versus strigosa (cetera glabra), tubo anguste cylindrico, in faucem sensim ampliato et eam subaequanti; faux subcylindrica, 1 mm diametro, intus annulatim hirsuta; lobi 5, ovato-deltoidei, recurvati, 1.5 mm longi vel longiores; antherae ca 2 mm longae, basi rotundatae, appendicibus late ovato-deltoideis 0.25 mm longis; styli ramuli (in alabastris) 4 mm longi, apicibus paullo compressis; achaenia columnaria, 5-angulata, glabra, paullo immatura 3.5 mm longa vel longiora; pappi setae uniseriatae ca 35, albae, rigidae, barbellatae, 5–6.5 mm longae; receptaculum 1 mm latum vel latius, paleaceum alveolatumque, alveolarum marginibus dense pilis erectis multicellularibus ad 0.5 mm longis hirsutis; paleae exteriores ca 8, oblanceolatae, 4–5 mm longae, 1 mm latae, apice laceratae; paleae interiores 5–8, longitudine exteriores aequantes, subulatae, minus quam 0.5 mm latae.

JALISCO: Mountains about 25 km SE of Autlán, above El Chante, in humid barranca-forest with *Abies, Alnus, Quercus,* elev. 1650–1850 m, probably flowering in January or February, collected when past flower, 19 Mar 1965, *McVaugh 23092* (MICH, type). Otherwise unknown.

The original collection was described in the field as a "woody vine, high-climbing on trees." Like so many Compositae in Nueva Galicia, it is not a twiner but a very long weak shrub that manages to find support among tree-branches until its own flowering branches extend beyond the crown of the tree and often cover it in profusion. This growth-habit is rather common in some genera of the Heliantheae but is rare in *Eupatorium.*

The generic position of this species may be challenged when better material becomes available. The most likely possibility would seem to be some relationship with the Senecioneae, e.g. with a genus like *Liabum,* in which the style-branches are also very long and slender, and the receptacle is often chaffy. The achenes and pappus in this new species, however, appear to be those of *Eupatorium,* and the anthers are not at all sagittate at base as they often are in *Liabum.*

Eupatorium ceriferum McVaugh, sp. nov.

Frutex arborescens 2–6-metralis, ramulis inflorescentiaque tomento coacto dealbata; folia mox glabrescentia, pilis subtus in venarum majorum axillis persistentibus; foliorum laminae triplinerves, 8–17 cm longae, 5–11 cm latae, triangulari-ovatae vel superiores minores, omnes ovatae, e basi lata truncato-subcordata (foliorum minorum rotundata), ad apicem acutum vel acuminatum (saepe falcatum) attenuatae, marginibus quoque latere dentibus 30–50 serrulatis, prope basin integris et in petiolos (2–) 4–7 cm longos abrupte decurrentibus; inflorescentia composita, rotundata vel subcorymbosa, paniculiformis, 5–15 cm longae, 8–20 cm lata; capitula ad 150 vel ultra, 20–22-flora, pedunculis (4–) 8–20 mm longis; involucrum campanulatum, latiusculum, basi paullo incrassatum et rotundatum, 5–7 mm altum, subbiseriatum, bracteis 1–3 anguste linearibus subtentum; phyllaria principalia subaequalia ca 15, oblongo-lanceolata vel elliptica, acuta, ca 1 mm lata; corolla candida, 6–7 mm longa, anguste infundibuliformis vel tubo angusto proprio quam fauce breviore, lobis triangu-

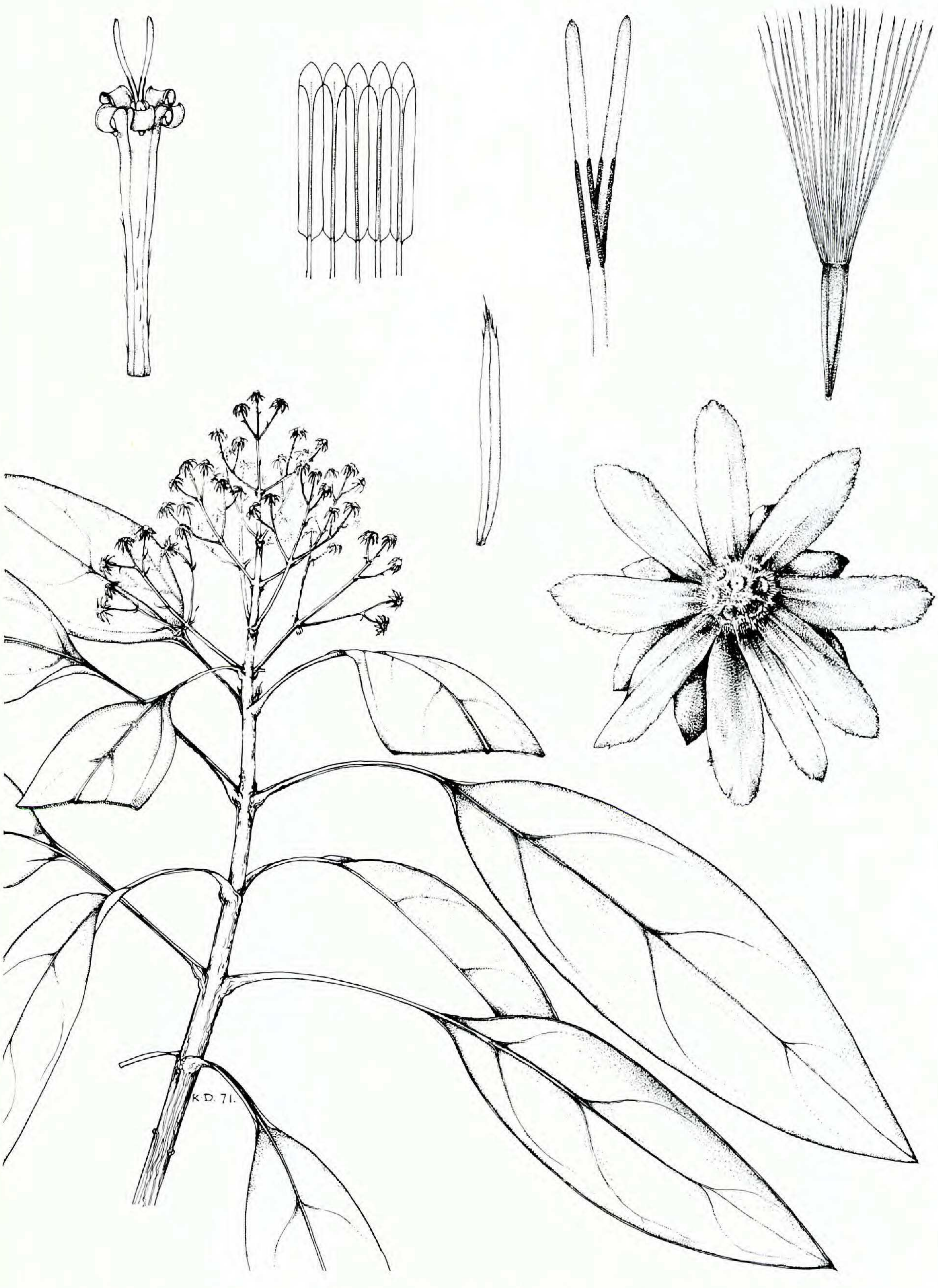

FIG. 11. *Eupatorium altiscandens* (*McVaugh 23092,* type). Leafy branch with over-mature inflorescence, X ½; receptacle and surrounding phyllaries of over-mature head, ca X 7.5; corolla, pale, and achene, X 5; anthers and style-tips, X 10.

laribus ca 1 mm longis, pilosis; antherae 1.5 mm longae, basi obtusae, appendicibus acutis 0.4 mm longis; styli ramuli filiformes exserti 4–5 mm; achaenia 3–4 mm longa, nigrescentia, sub-5-angulata, columnari-clavata, angulis minute strigosis, lateribus copiose globulis albidis ca 0.1 mm diametro conspersis; pappus albus biseriatus, setis interioribus ca 30 barbellatis, crassiusculis, apice paullo dilatatis, corollam subaequantibus, exterioribus paucis (ca 10), 0.5–1.5 mm longis; receptaculum glabrum.

JALISCO: Sierra de Cuale, SW of Talpa de Allende, barrancas in fir zone, elev. 1800–2250 m, 19–21 Nov 1952, *McVaugh 14392* (MICH, type); Talpa de Allende, above the headwaters of the Río Mascota, ca 20 km S of El Rincón, barranca in fir forest, 2000–2250 m, 29 Nov 1960, *McVaugh 21549*; Tecalitlán, Sierra del Halo, in pine forest, 1700–1800 m, 1 Dec 1959, *McVaugh & Koelz 1289*. Otherwise unknown.

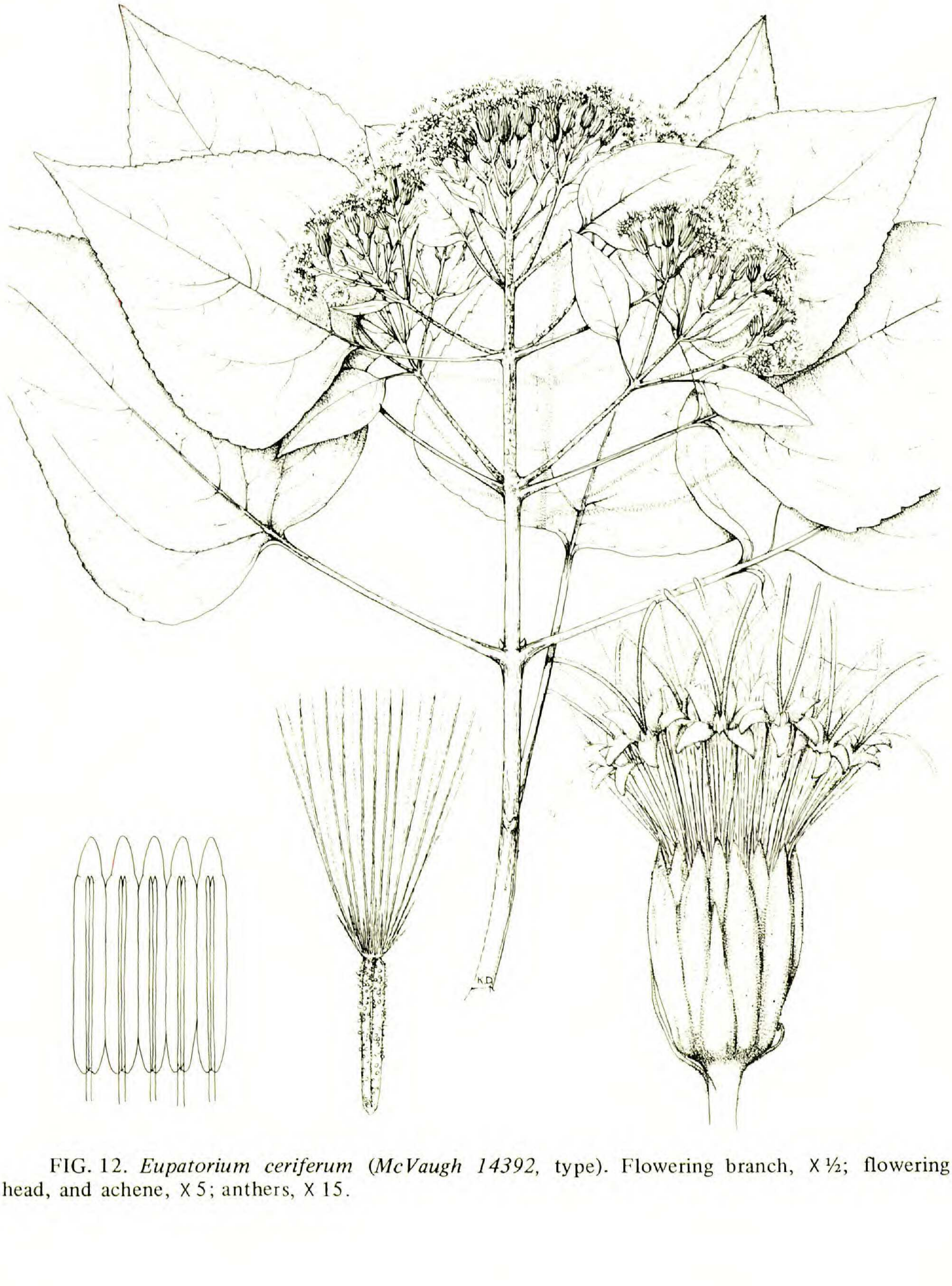

FIG. 12. *Eupatorium ceriferum* (*McVaugh 14392*, type). Flowering branch, X ½; flowering head, and achene, X 5; anthers, X 15.

This is one of a small group of shrubs and trees that have mostly been referred to *Eupatorium mairetianum* DC. They are widespread and abundant in pine and fir forests throughout the mountains of southern Mexico, flowering mostly from December to April. Members of the group may be recognized easily by the arborescent habit, the opposite and mostly palmately nerved leaves, large compound inflorescences of relatively large (mostly 1–1.5 cm long) but few-flowered heads (flowers mostly 12–30, rarely 50–70), and biseriate pappus consisting of an inner series of long bristles and an outer series of few–15 bristles 0.5–1.5 mm long. In Nueva Galicia there appear to be four species of the *mairetianum* group. These, and one somewhat similar species in which the pappus is also biseriate, may be contrasted as follows:

1. Peduncles and phyllaries evidently stipitate-glandular.
  2. Stems, petioles, and veins of the lower leaf-surface coarsely tomentose with brownish hairs up to 2 mm long; petioles 4–9 cm long; flowers about 30; phyllaries 15–20; achenes strigose. *E. chiapense* Rob.
  2. Branchlets and young herbage thinly arachnoid-tomentose, the leaves densely arachnoid in the vein-axils; petioles 2–3.5 cm long; flowers (30–) 45–70 in a head; achenes evidently stipitate-glandular and also bristly. [*E. chapalense* S. Wats.] *E. lasioneuron* Hook. & Arn.
1. Peduncles and phyllaries nearly glabrous to glutinous or arachnoid-tomentose, or both, the stipitate glands if present inconspicuous.
  3. Involucre 5–6 (–7) mm long; flowers 20–27 in a head.
    4. Flowers pink or purplish; inflorescence elongate, forming an ovoid or subcylindric thyrse; inflorescence and phyllaries green, very thinly tomentose; achenes glutinous, somewhat resinous-dotted. *E. cylindricum* McVaugh.
    4. Flowers white; inflorescence round-topped, broader than long; inflorescence and phyllaries whitened by the arachnoid tomentum; achenes copiously sprinkled with whitish waxy particles 0.1 in diameter. *E. ceriferum* McVaugh.
  3. Involucre (7–) 8–12 mm long; flowers white (the phyllaries often purplish); achenes glutinous or minutely resinous-dotted, or bristly in addition.
    5. Flowers (30–) 45–70 in a head; achenes usually both glandular and bristly; inflorescence and phyllaries usually somewhat whitened by the thin tomentum. [*E. chapalense*]. *E. lasioneuron.*
    5. Flowers (11–) 15–32 in a head; achenes usually with sessile glands but few or no bristles in addition.
      6. Inflorescence and phyllaries strongly glutinous, nearly glabrous; branchlets reddish; flowers 25–32 in a head. Jalisco and Durango. *E. mairetianum* DC., forma *elucens* McVaugh.
      6. Inflorescence and phyllaries moderately or indistinctly glutinous, usually somewhat whitened by the thin tomentum; flowers (11–) 15–22 (–25?); Jalisco to Hidalgo and México. *E. mairetianum* DC., forma *mairetianum.*

Eupatorium cylindricum McVaugh, sp. nov.

Frutex procerus, vel arborescens, caulibus 3–5-metralibus, ramulis foliisque juvenilibus paullo arachnoideo-tomentosis glutinosisque, pedunculis phyllariisque pauciglandulosis; folia mox glabrescentia, pilis secum nervum medium et subtus in venarum majorum axillis persistentibus; foliorum laminae late ovatae vel deltoideae, triplinerves vel venis pinnatis, 6–11 cm longae, 5–9 cm latae, saepe tam latae quam longae, vel sesquilongiores quam latiores, apice subobtusae, basi late truncato-subcordatae vel rotundatae, marginibus quoque latere dentibus late triangularibus 30–40 dentatis, prope basin integris et in petiolum 3–5 cm longum cuneatim decurrentibus; folia inflorescentiae ramulorum integra vel subintegra, ovata, 1–3.5 cm longa; inflorescentia thyrsiformis, cylindrica vel anguste ovoidea, (10–) 30–50 cm longa, paucifoliata, ramis ascendentibus 5–15 cm longis, 2–3-plo ramosis; capitula plurima, 21–27-flora, sub anthesi subrosea vel purpurascentia, pedunculis 4–10 mm longis; involucrum 5–6 mm longum, campanulatum, basi paullo incrassatum, 2–3-seriatum; phyllaria 20–25 (–30), interiora subaequalia ca 15, elliptico-lanceolata, acuta, 0.8–1 mm lata, exteriora vix breviora, extima angustiora; corolla alba vel pallide subrosea, 5–6 mm longa, anguste tubuloso-campanulata, lobis 0.8 mm longis pilosis; antherae 1.3–1.5 mm

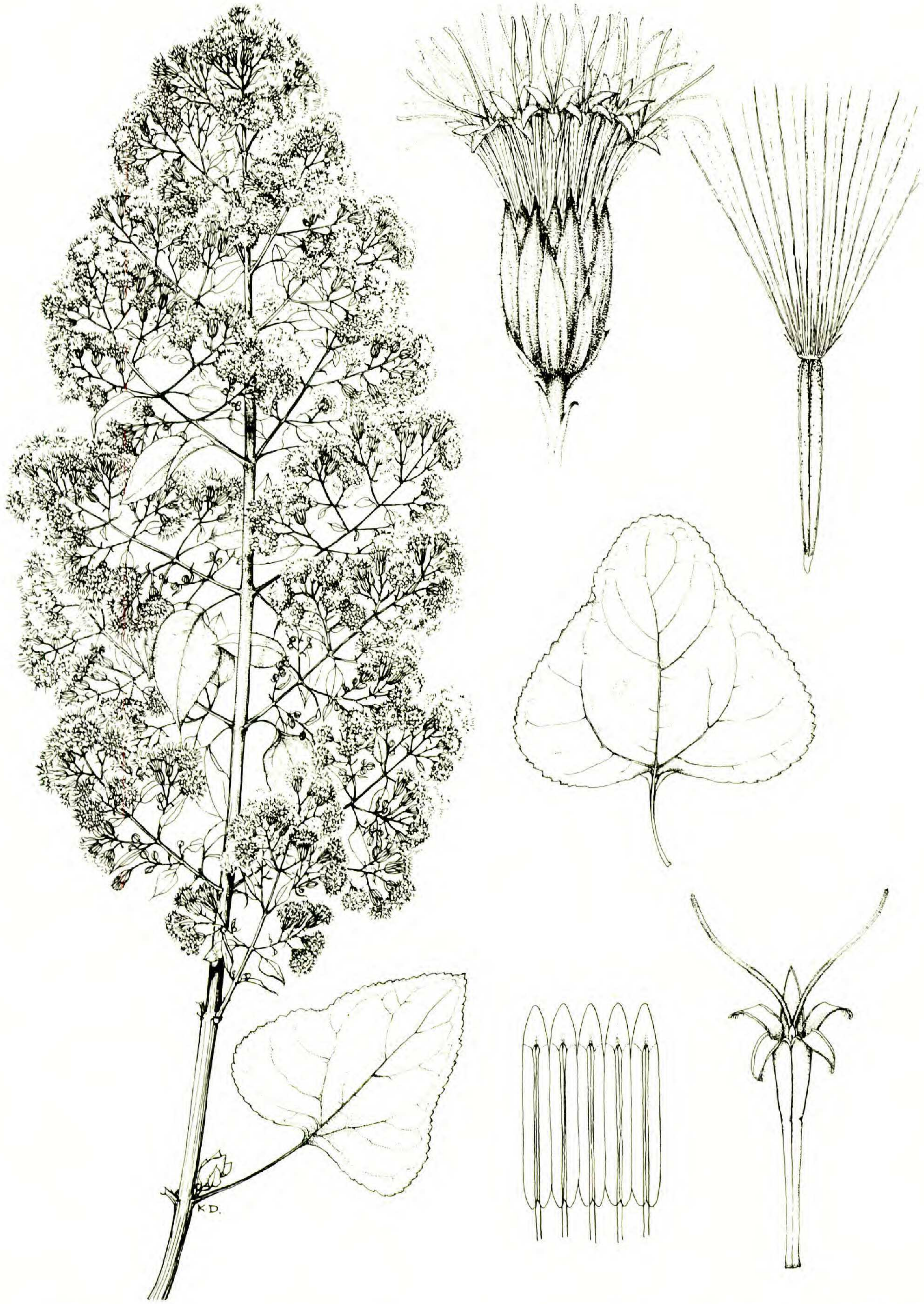

FIG. 13. *Eupatorium cylindricum.* Flowering branch, × ½ (*McVaugh 11799*). Detached leaf, × ½; flowering head, × 5; achene and corolla, × 7.5; anthers, × 15 (all from *McVaugh 23475,* type).

longae, basi obtusae, appendicibus 0.2–0.3 mm longis; styli ramuli filiformes, exserti 4 mm; achaenia 3.8–4.5 mm longa, nigrescentia, 5-angulata, clavato-columnaria, substipitata, globulis resinosis instructa, et prope apicem etiam stipitato-glandulosa; pappus subroseus, biseriatus setis interioribus ca 30, barbellatis, crassiusculis, apice paullo dilatatis, corollam subaequantibus, exterioribus paucis (ca 10), 0.5–1.5 mm longis; receptaculum glabrum.

JALISCO: Mountain stream-valley in pine-oak forest zone, ca 20 km SE of Talpa de Allende, 8–10 km S of El Rincón, elev. 1600 m, 2–3 Apr 1965, *McVaugh 23475* (MICH, type); 20–22 km S of Talpa, pine forest near headwaters of Río de Talpa, 1200–1450 m, 28–30 Mar 1965, *McVaugh 23330;* Nevado de Colima, SE foothills, 1600 m, 5 Apr 1951, *McVaugh 11799*; Nevado de Colima, NW slopes in pine forest above Jazmín, 2250 m, 31 Mar 1949, *McVaugh 10144;* above San Juan Cozalá, in oak forest, 1900 m, 29 Mar 1964, *L. M. Villarreal de Puga.*

MEXICO: Near Valle de Bravo, 22 Feb 1943, *Dodds 6.*

This species, rather easily recognized in the field by its pinkish flowers and pink pappus, and by the more or less cylindriform inflorescence which often terminates a leafless or nearly leafless branch, seems to be most abundant in relatively dry open habitats, rocky ridges and slopes in pine or oak forest at middle elevations (ca 1400–2200 m). *E. ceriferum* occurs in somewhat more humid habitats at similar elevations, in fir forest or in barrancas with more mesophytic species of *Quercus, Ostrya, Cornus* and other broad-leaved trees, or sometimes in pine forest. *E. mairetianum,* with which both the above have been confused, is primarily a plant of relatively humid forests at somewhat higher elevations, from 2000 to 3000 m.

Eupatorium dolichobasis McVaugh, sp. nov.

Herba perennis ramosa lignosa, interdum suffruticosa 1–1.5-metralis, foliis fere glabris, ramulis pedunculisque antrorse pilis minutis, pallidis subglandulosisque pubescentibus; folia opposita, membranacea, ovata vel rhomboideo-ovata, caulinia 8–15 cm longa, 4–7.5 cm lata (ramulorum florescentium simillima sed minora), attenuato-acuminata (apicibus angustis, integris 1–1.3 cm longis, obtusis vel acutis), basi rotundata vel subtruncata, triplinervia (nervis principalibus supra laminae basin 5–15 mm oriundis), marginibus utroque latere dentibus 15–25 ad 3 mm altis grosse serratis, basi integris, in petiolos tenues 2.5–5 cm longos cuneatim et saepe inaequaliter decurrentibus; inflorescentia subcorymbosa composita, ramis saepe 20–25 cm longis, corymbis secondariis confertis 6–10 cm longis latisque; capitula plurima 6–7 mm longa, 25–29-flora, pedunculis tenuibus linearibracteatis 3–8 mm longis; involucrum ca 3.5 mm longum campanulatum, biseriatum, basi abrupte contractum; phyllaria 12–14 subaequalia, lineari-oblonga vel -lanceolata (vel extimorum 1–3 breviora et angustiora), basibus puberulentibus incrassata bicostataque, apicibus membranaceis, ciliatis, obtusis vel subacutis glabra; corolla alba, 3–3.3 mm longa, tubo lineari quam fauce ampliata longiore vel eam subaequanti, lobis pilosis triangularibus 0.5–0.7 mm longis; antherae basi subauriculatae, appendicibus ovatis inclusis 1 mm longis vel paullo longioribus; styli ramuli 1–1.5 mm exserti; achaenia 1.5–1.8 mm longa, nigrescentia, clavato-columnaria, 5-angulata, ad basin pallidam callosam angustata, distaliter sub pappi basin coroniformem contracta; pappi setae fragilissimae ca 20, barbellatae, 3–3.5 mm longae; receptaculum glabrum.

JALISCO: Mountain stream-valley ca 20–25 km SE of Talpa de Allende, 12–13 km S of El Rincón, in barranca-forest with *Abies, Podocarpus, Quercus,* and other broad-leaved trees, elev. 1700–1900 m, 3–4 Apr 1965, *McVaugh 23476* (MICH, type); stream-valley ca 25 km SE of Autlán, above El Chante, in barranca-forest, elev. 2400–2600 m, 13 Apr 1949, *McVaugh 10270.*

Similar plants, with ovate leaves cuneate at base, and triplinerved from well above the base, are known from northern Michoacán (*McVaugh 9982*). In these the heads are larger than in the specimens from Jalisco, and the phyllaries more pointed.

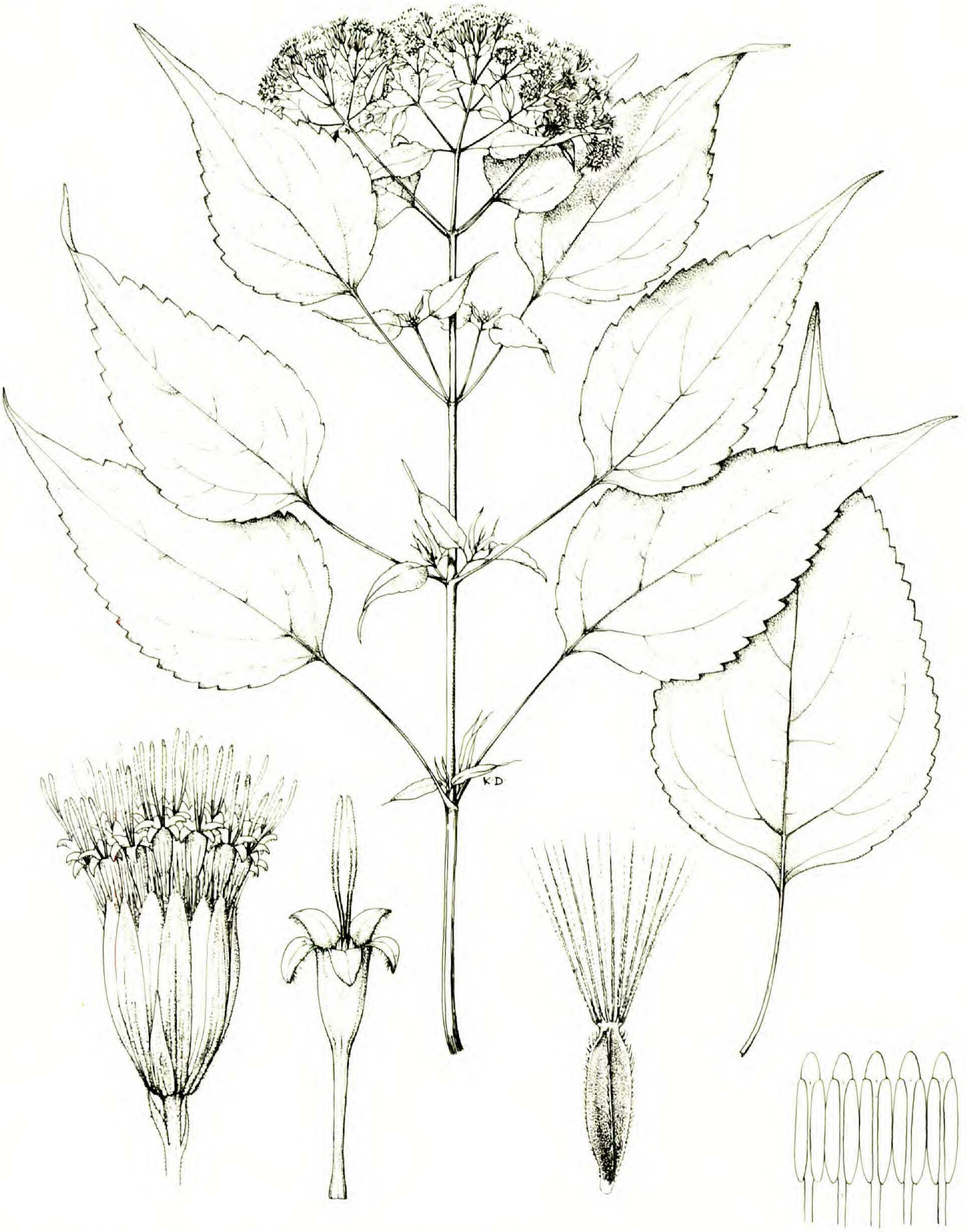

FIG. 14. *Eupatorium dolichobasis* (*McVaugh 23476,* type). Flowering branch, X ½; flowering head, ca X 6.5; corolla and achene, X 10; anthers, X 15.

This species is superficially similar to *Eupatorium conspicuum* Kunth & Bouché, as interpreted by Robinson in the *Trees and Shrubs of Mexico,* but in *E. conspicuum* the involucre is 4–6 mm long, the heads are about 40-flowered, and the leaves tend to be coarsely serrate even on the decurrent base.

Eupatorium geminatum McVaugh, sp. nov.

Herba perennis e caudice brevi, caulibus florentibus verisimiliter annuis 1.5-metralibus, diametro ad 5 mm, supra medium tenuiramosis; planta tota fere glabra, caule ramulisque rare pilis appressis multicellularibus instructis, foliorum venis margini-

busque paucipilosis; globuli resinosi pauci, inconspicui, vel nulli; foliorum paria ca 9–12, folia membranacea, opposita, sessilia, tripli- vel 5-plinervia, 5–12 cm longa, 2–5 cm lata, sensim acuminata, ad basin rotundata, marginibus basi excepta crenato-serratis, inter se linea transnodali connexis; rami 10–25 cm longi, inflorescentiam densam vix formantes, sed capitulis in quoque ramo 10–25 in corymbis secondariis irregularibus parvibracteatis laxe aggregatis, pedunculis 3–7 cm longis; involucrum

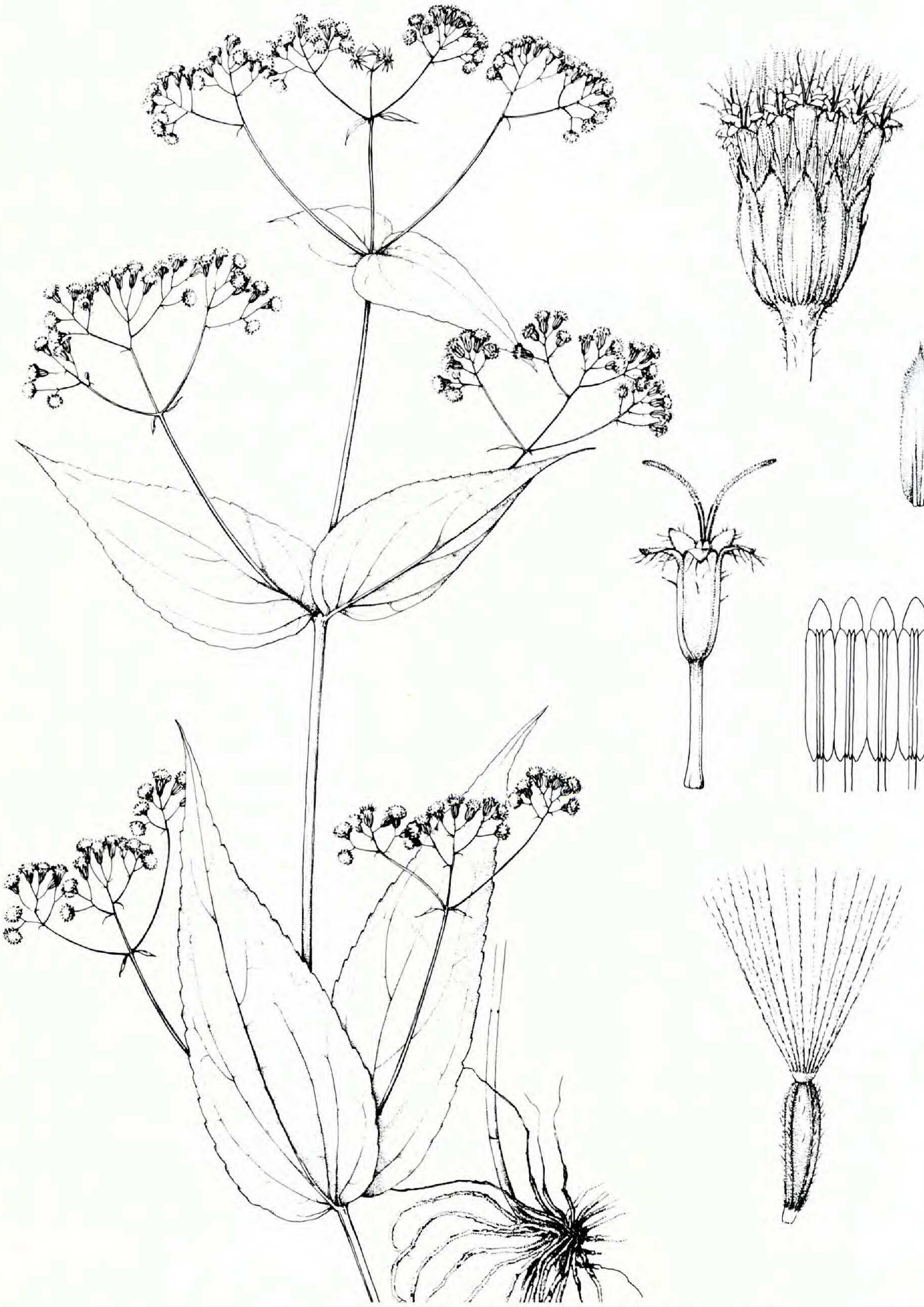

FIG. 15. *Eupatorium geminatum* (*McVaugh 24807,* type). Flowering branch, X ½; flowering head and detached phyllary, ca X 5; corolla and achene, X 10; anthers, X 20.

campanulatum 4–6 mm longum, ca 2-seriatum; phyllaria 12–15, ex apice pedunculi dilatato oriunda, subaequalia, lineari-lanceolata, 0.5–0.8 mm lata, basi bicostata incrassataque, apicibus tenuibus attenuatis, marginibus hyalinis; capitula sub anthesi 5–7 mm longa, 25–35-flora, corolla alba, 3–3.5 mm longa, tubo basi dilatato-campanulato, supra in faucem aequilongem abrupte expanso, lobis pilosis triangularibus 0.5 mm longis; antherae 0.6–0.7 mm longae, basi subauriculatae, appendicibus ovatis 0.2 mm longis; styli ramuli clavato-filiformes, 1.5–2 mm exserti; achaenia oblique fusiformia, ca 1.5–1.8 mm longa, nigrescentia, 5-angulata, lateribus angulisque strigosa, subaequaliter ad basin callosam et sub pappi basin coroniformem contracta; pappi setae albae ca 20, barbellatae, 3–4 mm longae, mox deciduae; receptaculum glabrum.

JALISCO: Tecalitlán, Sierra del Halo, in pine forest, elev. 2000–2200 m, 28–30 Nov 1959, *McVaugh & Koelz 1164*.

MICHOACAN: Forested slopes in deep shade, in calcareous soils, 3–6 km SE of Aserradero Dos Aguas, nearly W of Aguililla, elev. 2000–2100 m, 25 Nov 1970, *McVaugh 24689*; NW foothills of Cerro Tancítaro, 13–14 km S of Peribán de Ramos, in barrancas, elev. 1650–1700 m, 29 Nov 1970, *McVaugh 24807* (MICH, type).

Among the perennial, herbaceous, opposite-leaved, white-flowered species of *Eupatorium* this one seems relatively distinct. Among such species in Nueva Galicia it is the only one with subequal phyllaries, 20 or more flowers in the head, relatively few and fragile pappus-bristles, and thin sessile leaves. The pappus-bristles in this and a few other species of *Eupatorium* are almost as easily detached as those of our species of *Piptothrix*, but the latter are shrubs with even fewer pappus-bristles (commonly 10–15) and fewer than 20 flowers in a head.

Eupatorium halbertianum McVaugh, sp. nov.

Herba perennis 2-metralis, inflorescentia excepta simplex, caulibus basi ad 1 cm diametro, sub nodis compressis ad 1 cm latis, longitudinaliter purpureo-maculatis, supra nodos majores grosse pilosis; ramuli inflorescentiaque crebre breveque stipitato-glandulosi; folia membranacea, supra scabridula, praecipue in venis prope basin in superficiebus ambabus pilosa et stipitato-glandulosa, vix vel haud globulifera, longipetiolata, triangulari-hastata, 3 (–5)-nervia, 21–24 cm longa, 23–27 cm lata, gradatim acuminata, apice attenuato 1.5–2.5 cm longo, apicibus angulorum lateralium similibus sed brevioribus; folii lamina basi cordata, sinu aperto, non profundo, marginibus lateralibus basalibusque grosse dentibus irregularibus rotundis vel ovatis onustis; petiolus (8–) 14–18 cm longus, purpureus, distaliter venis majoribus divergentibus dilatatus, et laminae basi in aream triangularem haud marginatam transiens; venulae pellucido-reticulatae, in siccitate nec elevatae nec conspicuae; inflorescentia laxa, interrupta, paniculiformis ad 50 cm longa, ramulis lateralibus ascendentibus 20–30 cm longis, capitulis plurimis, in quaque panicula secondaria 10–25, pedunculis subclavatis 2–7 mm longis; capitula 8–9 mm longa, 10–15-flora; involucrum 5–6 mm longum, campanulatum, ca 2-seriatum, basi carnosulum; phyllaria ca 11–12, subaequalia vel exteriora 3–4 breviora, cetera 4–5 mm longa, ad 1 mm lata, lineari-lanceolata, acuta vel attenuata, basi incrassata glandulosaque, marginibus tenuibus ciliatis; corolla e roseo alba, glabra, 5–6 mm longa, anguste tubuloso-infundibuliformis, lobis ovato-triangularibus 0.7–0.8 mm longis; antherae 1.2 mm longae, basi auriculatae, appendicibus anguste ovatis 0.4 mm longis; styli ramuli filiformes, 3–4 mm longi; achaenia 2.5–3 mm longa, nigrescentia, clavato-columnaria, ca 5-angulata, lateribus angulisque strigosis; pappi setae albae 3–4 mm longae, 25–30, barbellatae, inter se distantes; receptaculum glabrum.

JALISCO: Near Santa Mónica (probable Lat. ca 20° N, Long. ca 104° 30′ W.), steep mountainsides in fir forest, elev. 1950–2050 m, 12–13 Nov 1952, *McVaugh 14049* (MICH, type). Known only from the type collection.

The leaves of this species recall in shape those of *E. deltoideum* Jacq., a plant of the eastern highlands of the Sierra Volcánica Transversal, ranging westward to Guanajuato. In *E. deltoideum* the leaves are almost conventionally sagittate, with two straight-sided deltoid lobes extending backward toward the petiole. In *E. halbertianum*

the lateral lobes extend at right angles to the long axis of the leaf, and the basal margins are convex and the blade often cordate. The heads of *E. deltoideum* are 35–40-flowered, the phyllaries are about twice as many as in *E. halbertianum*, and the flowers, achenes, and involucres are larger in most respects than in that species.

Eupatorium mairetianum DC. in DC. Prodr. 5: 167. 1836, forma **elucens** McVaugh, f. nov.

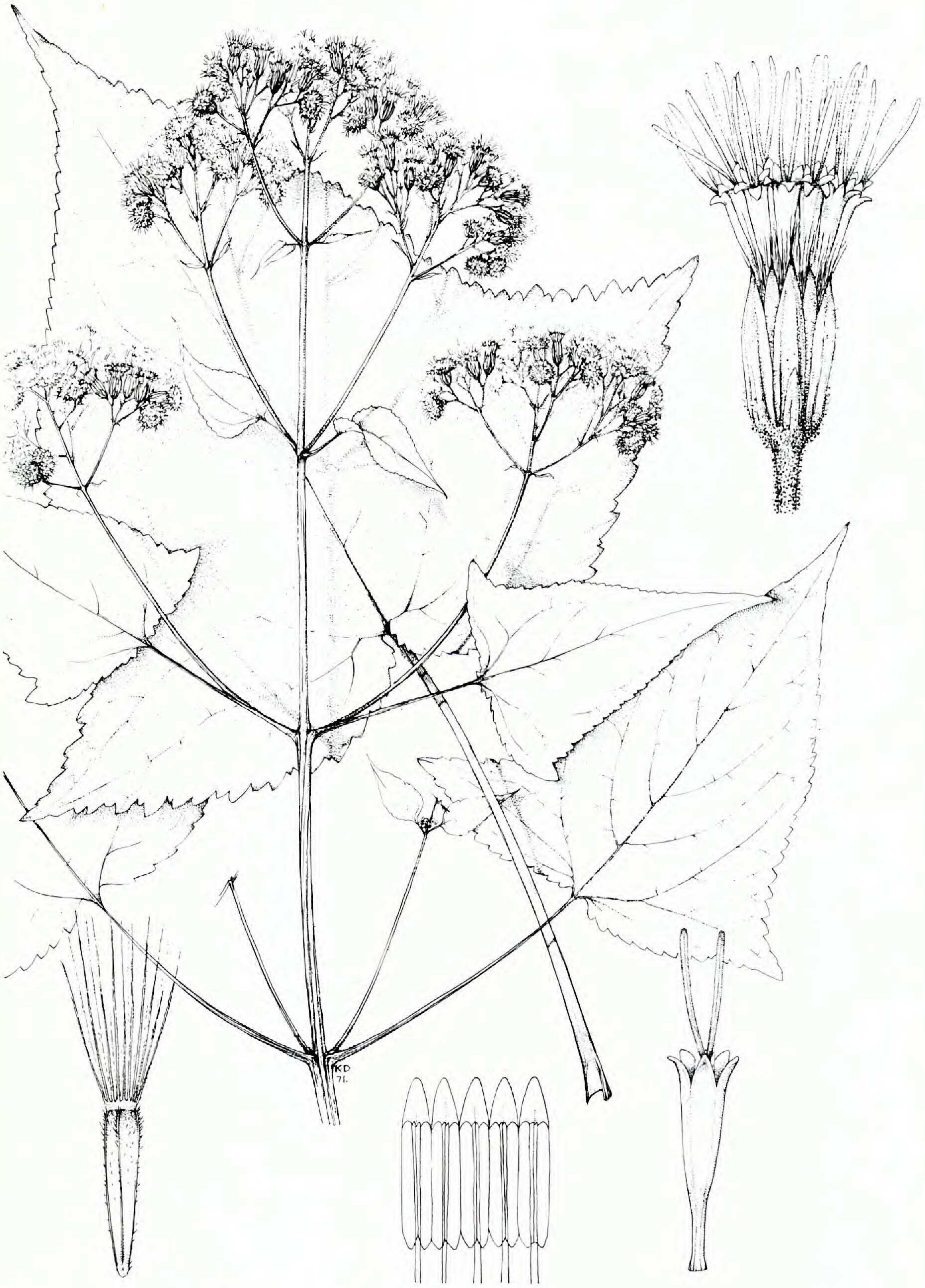

FIG. 16. *Eupatorium halbertianum* (*McVaugh 14049*, type). Flowering branch, X ½; flowering head and corolla, X 5; achene, X 7.5; anthers, X 15.

1. Inflorescentia et phyllaria valde glutinosa, fere glabra; ramuli purpureo-rubri; capitula 25–32-flora. *E. m.* forma *elucens.*
1. Inflorescentia et phyllaria modice vel vix glutinosa, plerumque tomento sparso paullo dealbata; ramuli non semper rubri; capitula plerumque 15–22-flora, floribus interdum 11 vel usque ad 25. *E. m.* forma *mairetianum.*

The following specimens of f. *elucens* have been examined:

JALISCO: Nevado de Colima, NW slopes above El Izote, barranca in fir zone, elev. 2600–2800 m, 26 Mar 1949, *McVaugh 10052* (MICH, type); Nevado de Colima, SE slopes, in fir forest, elev. 2850 m, 2 Apr 1951, *McVaugh 11710.*

DURANGO: Mountains between Durango and Mazatlán, between El Salto and the border of Sinaloa, elev. 1950–2400 m, *McVaugh 11557, 23602.*

SINALOA: Near the Durango border, road from Mazatlán to Durango, elev. 1950 m, 31 Jan 1962, *Breedlove 1722.*

What I am calling *Eupatorium mairetianum* (in the restricted sense) is a widespread species with somewhat larger heads than those of the closely related *E. ceriferum* and *E. cylindricum*; see the key under *E. ceriferum.* The nomenclatural type (*Mairet!* s.n. in G-DC) represents a nearly glabrous but only slightly viscid plant, with narrow phyllaries and a relatively diffuse inflorescence. Similar plants are found commonly in the Valley of Mexico and from as far east as Mt. Ixtaccíhuatl, and occur, although apparently less commonly, as far west as Cerro Tancítaro, C. Patamban, and the Nevado de Colima. In Nueva Galicia, however, the species is more often represented by plants in which the herbage is even less viscid and somewhat more densely arachnoid-tomentose, the phyllaries are a little less narrowly pointed, the inflorescence a little more compact, and the flowers mostly 15–22 in a head. The taxonomy of this and related species, in the whole area from north-western Mexico to Central America, is in need of further study. The newly described f. *elucens* apparently represents one extreme, perhaps intermediate between *E. mairetianum* and *E. lasioneuron* Hook. & Arn. In the latter the number of flowers in a head varies from about 30 to almost 100, and the herbage is somewhat stipitate-glandular. In Nueva Galicia it is not always possible to separate *E. lasioneuron* and *E. mairetianum* satisfactorily, but in general plants with many-flowered heads tend to be somewhat stipitate-glandular.

Eupatorium misellum McVaugh, sp. nov.

Frutex debilis 50–80 cm altus, ramis rare pubescentibus, foliis (venis majoribus exceptis) mox glabrescentibus; folia subtus crebre resinoso-globulifera, opposita, membranacea, triplinervia, lanceolata, 7–12 cm longa, 1–2 cm lata, 6–10-plo longiora quam latiora, ad apicem acutum angustissimum attenuata, ad basin angustam subaequaliter producta, marginibus utroque latere dentibus 4–7 remotis serrulatis, ad basin in petiolos 3–8 mm longos sensim transientibus; capitula pauca, plus quam 1 cm longa, ca 45-flora, in fasciculis 1–5-cephalis ramos superiores divaricatos 5–12 cm longos terminantia, pedunculis 9–17 mm longis; involucrum 7–9 mm longum, medio 3.5–4 mm crassum, campanulatum vel ad apicem angustatum, 5–6-seriatum; phyllaria ca 50–60 valde imbricata appressa, exteriora gradatim breviora, intima 5–8 longiora angusta, sublinearia vel oblanceolata 1 mm lata, straminea, cetera oblonga 1.5–1.8 mm lata, late obtusa, marginibus latis albis membranaceis fimbriato-ciliatis, costa bilineata viridi fere ad apicem extensa; corolla verisimiliter caesia, 5 mm longa, glabra, angustissima, tubo cylindrico quam fauce longiore et in eam sensim ampliato, lobis triangularibus 0.5 mm longis; antherae 1.7 mm longae, basi obtusae, appendicibus ovatis 0.3 mm longis; styli ramuli filiformes, 3–4 mm exserti, caesii, vividi; achaenia 4–4.2 mm longa, nigrescentia, clavata, substipitata, 3–5-angulata, angulis prominentibus scabrellis; pappi setae ca 40, grossae, barbellatae, 4–5 mm longae, albidae; receptaculum glabrum, breve conicum, 1.5 mm latum, 1 mm altum.

JALISCO: Talpa de Allende, precipitous mountainsides on the seaward-facing slopes above La Cuesta, on rock ledges in tropical subdeciduous forest, elev. 800–1400 m, 15–16 Oct 1960, *McVaugh 20254* (MICH, type). Known only from the type-collection.

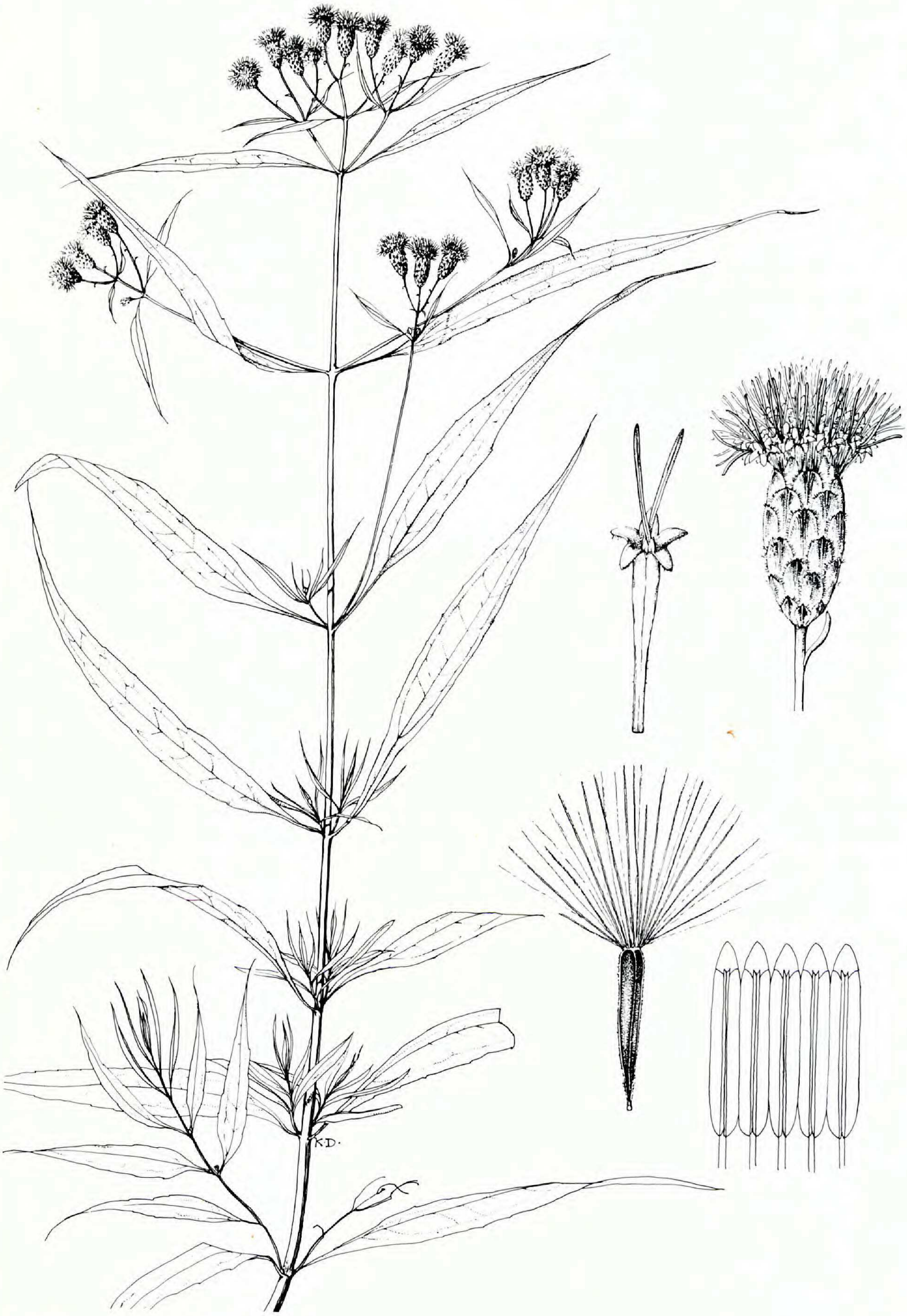

FIG. 17. *Eupatorium misellum* (*McVaugh 20254,* type). Flowering branch, X ½; flowering head, ca X 2.5; corolla and achene, ca X 5; anthers, X 12.5.

Apparently referable to the Sect. *Cylindrocephala* as defined by DeCandolle, Robinson, and others, because of the numerous closely imbricated phyllaries in 5–6 series, but not like any other Mexican species of that alliance.

Eupatorium trinionum McVaugh, sp. nov.

Herba perennis 1–2-metralis, e caudice brevi lignoso, caulibus erectis solitariis vel paucis, duris, basi ad 5 mm diametro, inflorescentia excepta simplicibus, atropurpureis vel purpureo-maculatis, tota longitudine pilis grossis flaccidis multicellularibus pubescentibus, pilis in inflorescentia numerosissimis et cum globulis resinosis numerosis et interdum glandulis stipitatis immixtis; folia opposita, subtus crebre resinoso-globulifera et venis praecipue pilosa, supra et marginibus scabridula; laminae 5–11 cm longae late ovato-cordatae vel -deltoideae, saepe tam latae quam longae vel ad sesquilongiores quam latiores, ca sesquilongiores quam petiolos, acutae vel foliorum inferiorum obtusae, basi late truncato-cordatae, 3(–5)-nervatae, marginibus (sinu basali excepto) utroque latere dentibus 30 vel ultra grossis obtusisque crassimarginatis instructis; petioli 2–6 cm longi; inflorescentia laxa subcorymbosa composita, ad 30 cm longa lataque, ramis divaricatis per folia parva subtentis; capitula ca 1–1.5 cm longa, 23–35-flora, subumbellatim aggregata, pedunculis 5–10 mm longis; involucrum 5.5–7.5 mm longum, campanulatum, basi carnosulum, ca 2-seriatum; phyllaria 12–18, subaequalia, pubescentia et globulifera, lineari-lanceolata, 0.6–1 mm lata, intima saltem apicibus tenuibus attenuatis, exteriora interdum breviora et tantum acuta, extima 1–3 plerumque quam cetera multo breviora angustioraque; corolla glabra, subrosea vel pallide purpureo-rosea, 5.5–6.5 mm longa, supra tubum brevem anguste tubuloso-infundibuliformis, lobis triangulari-ovatis 1 mm longis vel brevioribus; antherae 1.4–2 mm longae, quam corolla pallidiores, basi auriculatae, appendicibus ovatis 0.3–0.4 mm longis; styli ramuli filiformes, 3.5–6.5 mm exserti; achaenia 2.3–3 mm longa, nigrescentia, clavato-columnaria, 5-angulata, sub pappi basin coroniformen brunneam contracta, copiose breve hispidula; pappi setae plerumque purpurascentes 20–25, 3–5 mm longae, barbellatae, fragiles, vix contiguae; receptaculum glabrum.

ZACATECAS: Puerto de la Paja, 20 km WSW of Valparaíso, grassland with scattered oaks, elev. 2250 m, 30 Oct 1963, *Rzedowski 17535.*

AGUASCALIENTES: Road to Calvillo, 33–34 km W of Aguascalientes, rocky hills among small oaks, elev. 2100 m, 3 Nov 1959, *McVaugh & Koelz 146.*

JALISCO: Near Mezquitic, 8–10 km SE of El Mortero, open oak woodland, elev. 2450 m, 5 Nov 1963, *Feddema 2456* (MICH, type); Volcán Tequila, elev. ca 2300 m, 24 Oct 1970, *Webster & Breckon 15875.*

In many ways this species resembles *Eupatorium rubricaule* H.B.K., but in the latter the involucre is 3.5–4 mm long, the phyllaries glabrous or nearly so, and herbage essentially without glandular dots, the flowers and achenes smaller than in *E. trinionum,* and the pappus shorter in relation to the corolla. *E. rubricaule* is one of the earliest species of *Eupatorium* to flower, beginning early in September in Nueva Galicia, whereas *E. trinionum* as far as known flowers in October and November. *E. rubricaule* is a plant of relatively humid woodlands and barrancas, often at elevations of 2500 m or more, and ranging from Jalisco eastward, but *E. trinionum* appears to be adapted to relatively dry grasslands and woodland openings in the northern part of Nueva Galicia.

Hofmeisteria urenifolia (Hook. & Arn.) Walp., var. **mexiae** (Rob.) McVaugh, comb. nov. *Fleischmannia urenifolia* var. *mexiae* Rob. Contr. Gray Herb. II. 96: 18. 1931.

This is a distinctive plant, at once recognized by the matted-tomentose or hirsute stems and petioles, covered with delicate hairs up to 3 mm long; the leaves are undivided, ovate, obtuse, truncate or cordate at base, the margins incised-dentate with 6–12 lobelike teeth, each large tooth bearing 2–7 small acute serrations.

In *H. urenifolia* var. *urenifolia* the leaves are pinnately divided to the midvein, or if occasionally merely lobed or dentate, the blades rounded at base, with coarse and nearly simple teeth; the stems are glabrous or glandular, or thinly hirsute.

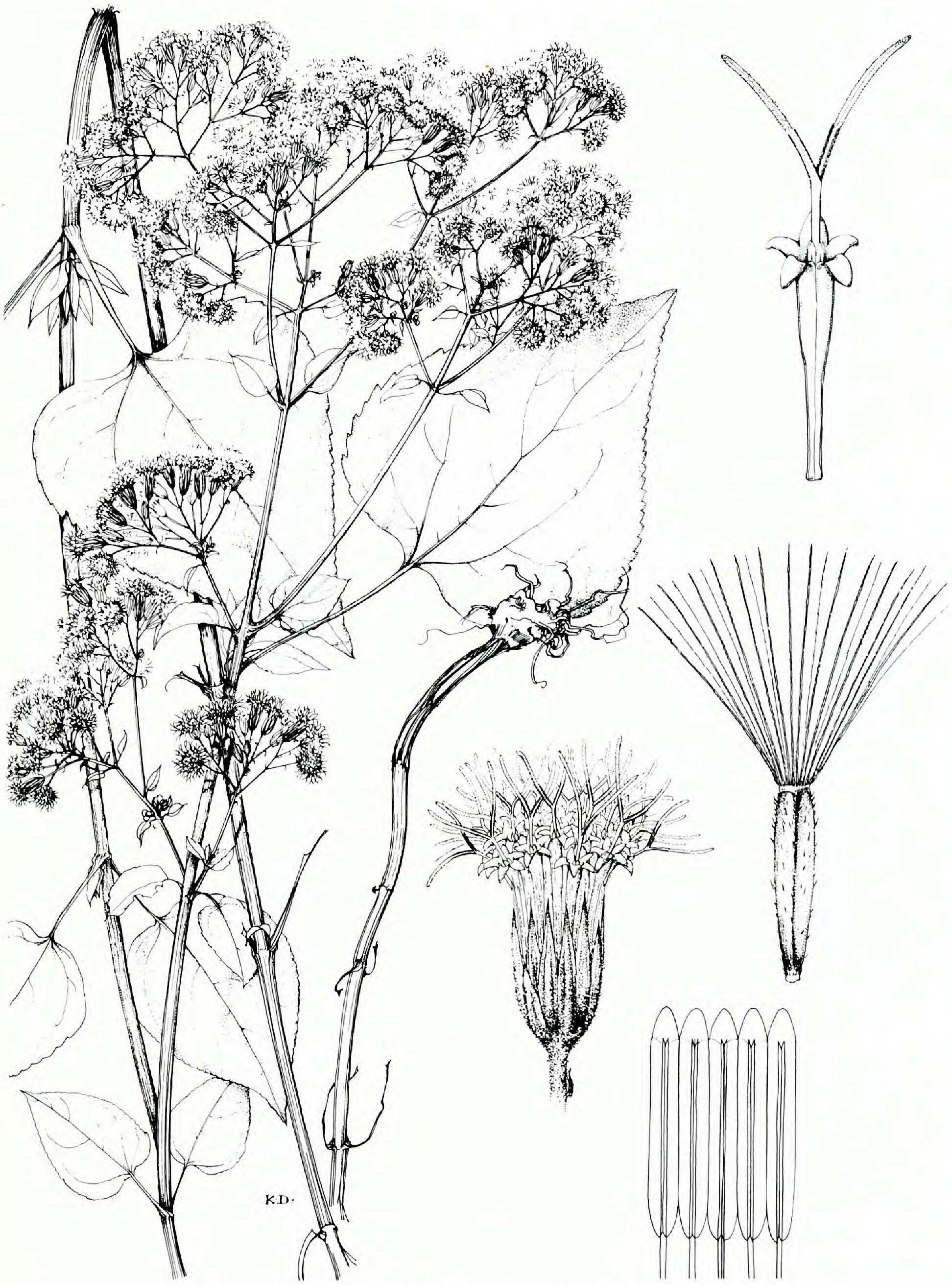

FIG. 18. *Eupatorium trinionum* (*Feddema 2456,* type). Flowering plant, X ½; flowering head, ca X 2.5; corolla, X 5; achene, X 10; anthers, X 15.

Stevia myricoides McVaugh, sp. nov.

Frutex pauciramosus 1.5–2-metralis, ramis foliisque oppositis; ramuli dense vel rare hispidi, pilis attenuatis brunnescentibus vel pallidis, erectis sed antrorse curvatis; ramulorum minimorum, pedunculorum phyllariorumque pili interdum conspersi, plerumque pallidiores, tenuiores, et cum globulis resinosis immixti; folia matura carnosula, omnino glabra vel plerumque subtus secus costam saltem pilis longis obsita, supra secus costam saltem hispidula, utrinque obscure resinoso-globulifera; folia

pennivenia vel obscure triplinervia, elliptica, lanceolata vel oblanceolata, basi petioliformi inclusa 6–13 cm longa, 1–3 cm lata, 3–6 (–10)-plo longiora quam latiora, rami superiora plerumque acuta vel ad apicem ultimum obtusiusculum attenuata, rami inferiora saepe oblanceolata obtusaque; laminae utroque latere dentibus paucis vel usque ad 10 distantibus et plerumque obscuris crenato-serratae, basi productae, acutae vel cuneatae, marginibus decurrentibus fere ad basin petioli extensis sed ibi angustissimis, petiolo ut videtur 1 cm longo, basi dilatato sed cum basi petioli oppositi haud contiguo; venulae foliorum siccorum supra minute impressae, subtus paullo elevatae; inflorescentia composita, convexa, corymbiformis, usque ad 10 cm longa lataque, capitula subsessilia in apicibus ramulorum glomerulata conspersa ca 1 cm longa; phyllaria pallide viridia, dorsaliter copiose pubescentia, 5–6.5 mm longa, nunc omnino linearia (apice obtusa vel rotundata), nunc acuta, attenuata; corolla alba, 5–6 mm longa, tota longitudine pilosa, tubo angusto quam fauce subcylindrica multo breviore, lobis latis 1–1.5 mm longis; achaenia homomorpha, exaristata 4–6 mm longa, clavato-columnaria, praecipue versus apicem hispidula; pappus ex squamis albis opacis scariosis, basi connatis, truncatis erosisve 0.4–0.6 mm longis compositus.

NAYARIT: Ravines in pine forest between Jalcocotán and Tepic, elev. 1050–1100 m, 22 Apr 1951, *McVaugh 12126*.

JALISCO: San Sebastián, E of Arroyo Sta. Gertrudis, elev. 1500 m, 17 Jan 1927, *Mexia 1501;* 20–22 km S of Talpa de Allende, in pine forest, elev. 1200–1450 m, 28–30 Mar 1965, *McVaugh 23299* (MICH, type); same locality, sterile 23–25 Nov 1960, *McVaugh 21359*; 20–25 km SE of Talpa, 12–13 km S of El Rincón, humid forest of *Abies, Podocarpus* and broad-leaved trees, 1700–1900 m, 3–4 Apr 1965, *McVaugh 23461;* 30–35 km SE of Autlán, Sierra de Manantlán, deciduous forest with *Podocarpus* and broad-leaved trees, 1500–1900 m, 22–23 Mar 1965, *McVaugh 23181.*

Among the species of *Stevia* that are shrubs with opposite leaves, awnless achenes and white or nearly white flowers, *S. nelsonii* Rob., *S. lucida* Lag., and some forms of *S. salicifolia* Cav. are gummy and nearly glabrous; *S. phlebophylla* A. Gray, *S. glandulosa* Hook. & Arn., and the newly described *S. rzedowskii* are copiously stipitate-glandular. The others lack gland-tipped hairs, and if the foliage is gummy the phyllaries are pubescent. In three of these species (*S. scabrella* Benth., *S. subpubescens* Lag., and *S. dictyophylla* Rob.) the corolla is glabrous or pilose on the lobes only, whereas in *S. jaliscensis* Rob. and *S. myricoides* the corolla is pilose almost its whole length. *S. jaliscensis* and *S. myricoides* are very different, and may be effectively contrasted as follows:

1. Leaves densely soft-pubescent beneath, ovate-lanceolate, the petioles usually 1–2 cm long; achenes 3–4 mm long, the pappus a thin erose ring or collar 0.3–0.4 mm high; dry woodland or grassland, flowering October to January. *S. jaliscensis.*
1. Leaves glabrous (or the larger veins pilose), elliptic-lanceolate or -oblanceolate, scarcely petiolate; achenes 4–6 mm long, the pappus of white coriaceous opaque scales 0.4–0.6 mm long; humid montane forest, flowering January to April. *S. myricoides.*

Stevia porphyrea McVaugh, nom. nov. *Stevia purpurea* sensu Rob. Contr. Gray Herb. II. 90: 120. 1930, not *Stevia purpurea* Pers. Syn. Pl. 2: 402, nom. illegit. 1807.

AGUASCALIENTES: *Hartweg 135* (GH, type).

The name *Stevia purpurea* Persoon was superfluous when published because its author based it wholly or at least primarily on *Mustelia Eupatoria* Spreng. [*Stevia Eupatoria* (Spreng.) Willd.]. There is nothing in the protologue to indicate that Persoon saw a specimen. His description of the foliage differs only slightly (and probably not significantly) from that given by Willdenow in the *Species Plantarum,* and his description of the pappus is taken verbatim from Willdenow.

Stevia rzedowskii McVaugh, sp. nov.

Frutex viscidus 0.8–1-metralis, multiramosus, partibus omnibus stipitato-glandulosus, foliis rariuscule pilis glandulosis vestitis, bracteis phyllariisque interdum pilos glandulosos pilosque longos eglandulosos ferentibus; folia opposita, petiolata,

lanceolata, pennivenia, laminis 6–10 cm longis, 1.2–3 cm latis, 3–4-plo longioribus quam latioribus, apicibus acutis angustis attenuatis, marginibus supra basin acutam non profunde sed acute serratis, basi in petiolos subalatos 7–25 cm longos cuneatim decurrentibus; capitula 13–14 mm longa, in glomerulis bracteatis sessilia, glomerulis 1–5 cm pedunculatis axillaribus, inflorescentiis axillaribus dimidio brevioribus quam foliis subtendentibus vel eis subaequalibus; phyllaria 6–8 mm longa, membranacea,

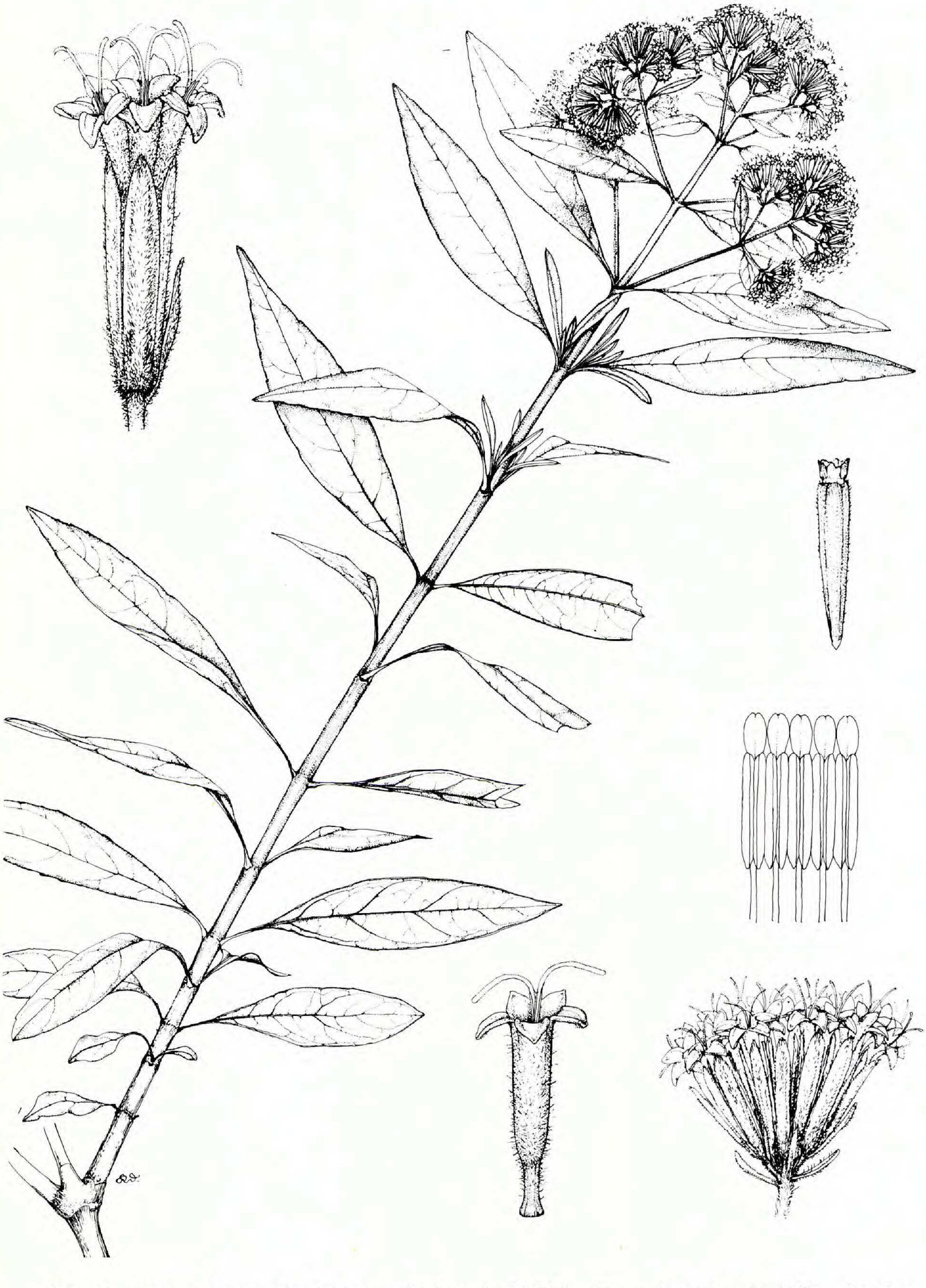

FIG. 19. *Stevia myricoides* (Jalisco, *McVaugh 23461*). Flowering branch, × ½; involucrate cluster of heads, × 1.5; single flowering head, corolla, and achene, × 5; anthers, ca × 10.

lineari-lanceolata apicibus angustis attenuatis; corolla 8–8.5 mm longa, tubo brevi et fauce longiore, subcylindrica subrosea, crebre pilis erectis eglandulosis 0.3 mm longis obsita, et obscure glanduloso-puberulenti; faux sub basibus loborum albido-roseorum brevipilosorum ampliata, infundibuliformis; achaenia 4–5 mm longa, fere vel omnino glabra, nigrescentia, homomorpha, exaristata, annulo integro vel lobulato 0.2 mm alto coronata.

Species in honorem dixi cl. Jerzy Rzedowski (1926–   ), qui de plantis mexicanis egregie scripsit.

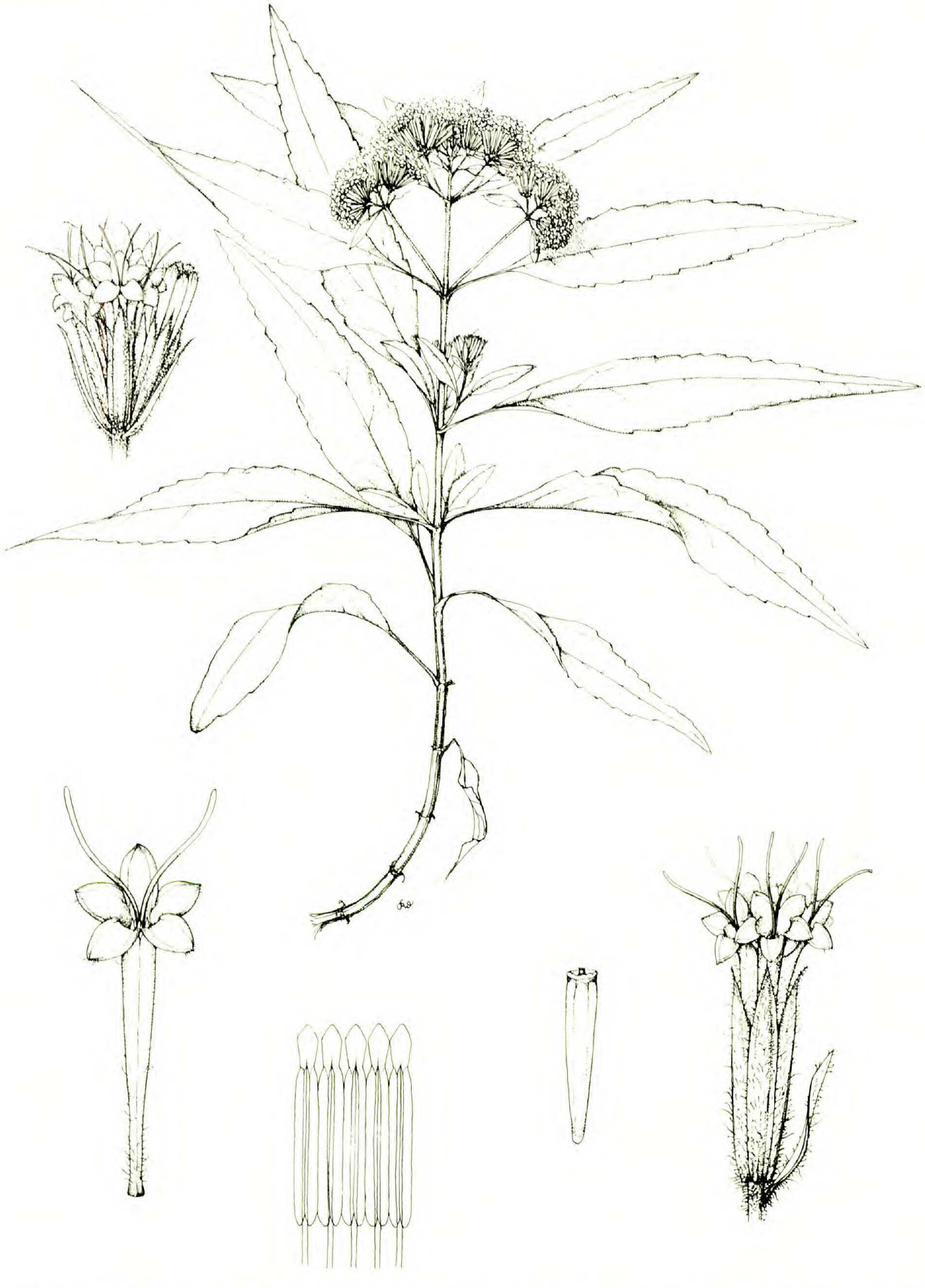

FIG. 20. *Stevia rzedowskii* (*Rzedowski 18262,* type). Flowering branch, X ½; involucrate cluster of heads, X 2; single flowering head, X 3.5; corolla and achene, X 5; anthers, X 10.

ZACATECAS: Mpio. de Juchipila, Cerro de Piñones, 4 km W of Pueblo Viejo, elev. 2000 m, 25 Jan 1964, *Rzedowski 18262* (MICH, type); mountain summits between Jalpa and Tlaltenango, elev. ca 2400 m, 23 Dec 1970, *McVaugh 25643.*

This plant is common in the open forests dominated by *Quercus resinosa,* on the high semi-arid ridges in southern Zacatecas. In many ways it resembles *Stevia glandulosa* Hook. & Arn., but in that species the leaves are ovate and about twice as long as wide, the corolla is shorter (ca 7 mm long) and the corolla-tube is gland-dotted, not pilose. *S. glandulosa* is a plant of the foothills of the Pacific Slope, at elevations from 1000 to 1500 m, whereas *S. rzedowskii* has a somewhat more inland range, and occurs in higher, dryer situations.

Stevia villaregalis McVaugh, sp. nov.

Herba perennis erecta 30–85 cm alta, caulibus foliosissimis solitariis vel paucis, basi usque ad 4–5 mm crassis, corymbo terminali composito convexo 5–16 cm longo latoque excepto simplicibus; caules inferne glabri; rami pedunculique sparsim pilis brevibus pallidis multicellularibus obsiti, rare resinoso-globuliferi sed non stipitato-

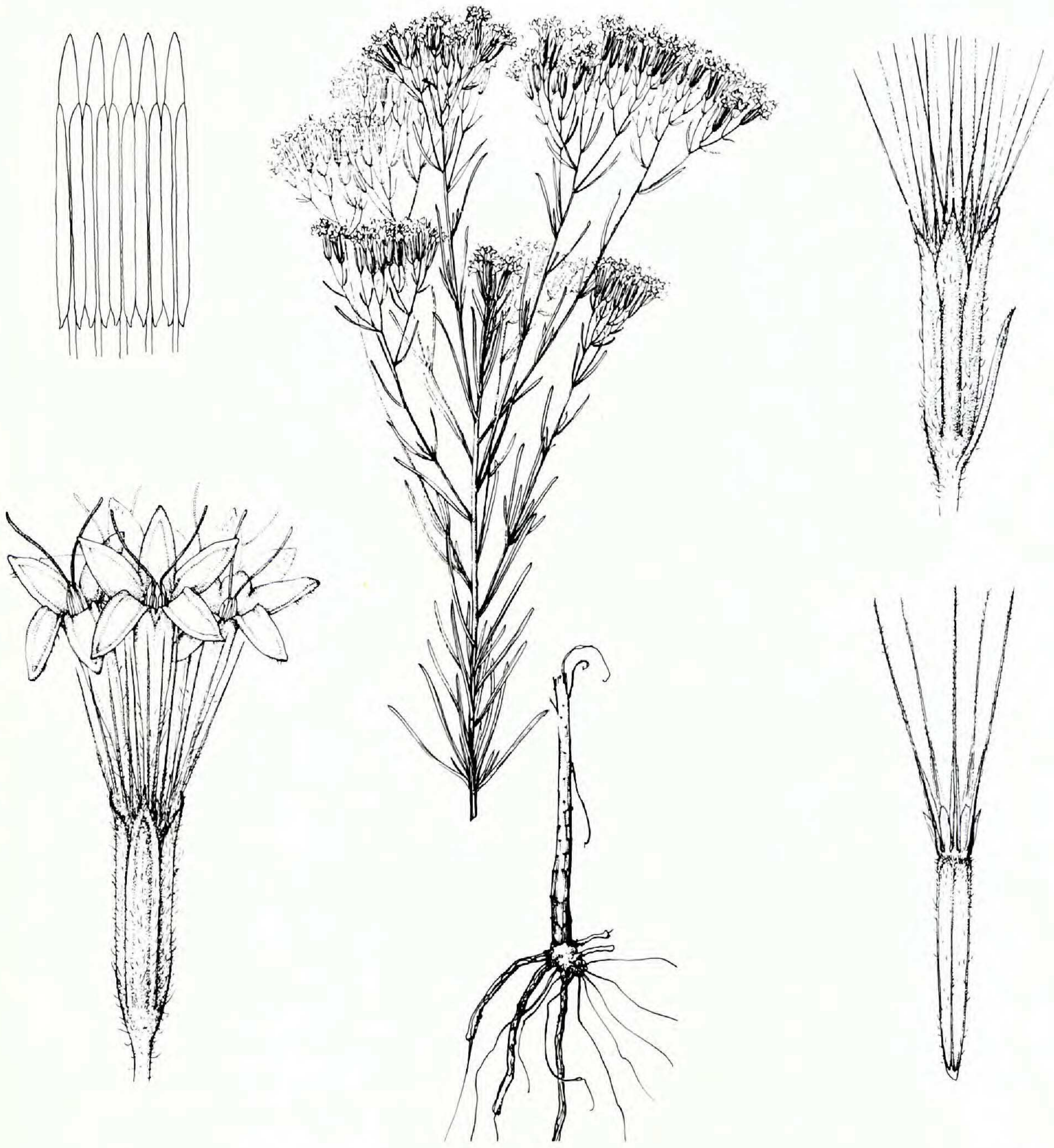

FIG. 21. *Stevia villaregalis.* Flowering plant, X ½ (*McVaugh 23867,* type). Flowering head, X 5; fruiting head and achene, X 5 (Jalisco, *Pringle 11579*); anthers, ca X 12.5 (*Pringle 11579*).

glandulosi; folia omnino glabra vel pilis grossis paucis munita, utrinque crebre globulis resinosis impressis instructa; folia caulinia alterna (ramulorum brevium sterilium opposita), numerosissima, valde adpresso-ascendentia, axillis saepe proliferis; folia linearia, sessilia, 2–6 cm longa, 1–2 mm lata, ad apicem obtusum crassicallosum angustata, uninervia, integra vel sub apice grosse utroque latere 1–2-dentata, carnosula, plana vel supra paullo concava; corymbi rami 10–20 vel numerosiores, valde ascendentes, bracteati, 3–4-plo furcati, capitulis plurimis terminalibus inflorescentiam compactam rotundatam formantibus; capitula 10–13 mm longa erecta, pedunculis maturis axillaribus 3–7 mm longis, capitulorum terminalium pedunculis 1–3 mm longis vel brevioribus; phyllaria 5.5–7 mm longa, oblonga, grosse pilosa et resinoso-globulifera, basi late obtuseque carinata, apice longe acuta et cuspidato-acuminata, apicibus triangularibus patentibus; corolla alba, 5–6 (–7) mm longa, tubo angusto faucem infundibuliformen subaequanti et in eam sensim transienti, lobis 1.5–2.5 mm longis, 1 mm latis, pilosis (corolla cetera glabra vel pilosa et resinoso-globulifera); antherae brunnescentes, 2 mm longae, appendicibus cinnamomeis oblongo-ovatis 0.5 mm longis; achaenia homomorpha, nigrescentia, clavato-linearia, (3.7–) 4.2–5 mm longa, distaliter praecipue strigosa, 5-aristata (raro achaenium unicum 4-aristata), aristis corollae tubo fere aequilongis, basi complanatis rigidisque, squamis angustis 0.7–1 mm longis alternantibus.

Species Luz María Villarreal de Puga, guadalajaranae, quae mecum plantas jaliscenses plurimas humanissime communicavit, grate nominavi.

NAYARIT: Pine-oak forest ca 40 km SE of Tepic, elev.1300 m, 4 Sep 1960, *McVaugh 18723.*

JALISCO: Periodically flooded meadows 13–14 km N of Ixtlahuacán del Río, with *Isoetes, Stevia serrata, Aster subulatus,* elev. 2000 m, 13 Sep 1967, *McVaugh 23867* (MICH, type); same locality, *Cronquist 10285, Villarreal de Puga 1272;* near Guadalajara, elev. ca 1500 m, 9 Oct 1903, *Pringle 11579;* 19 Sep 1886, *Palmer 534; Palmer 316, Pringle 2486, Barnes & Land 198a;* 17–18 km SE of Lagos de Moreno, grassland, elev. 1900 m, 7 Sep 1952, *McVaugh 12819;* 30 km E of Arandas, elev. 2100 m, 15 Nov 1970, *McVaugh 24408.*

Plants of this species are superficially like narrow-leaved specimens of the common *Stevia serrata* Cav., but differ in the readily observed characters of glabrous or nearly glabrous stem, strongly appressed and nearly glabrous, somewhat fleshy leaves that often lack sterile fascicles in the axils, and isomorphic 5-awned achenes. Where *S. serrata* and *S. villaregalis* have been found growing together, as at the type-locality of the latter, they are quite different in habit and aspect, and show no evidence of intergradation.

Tribe IV. Heliantheae

Bidens subspiralis McVaugh, sp. nov.

Annua, gracilis submetralis, caulibus 1–2 mm crassis, plusminusve tetragonis, angulis saltem et adaxiale prope ramorum bases pubescentibus; rami plerumque in axillis superioribus, interdum in axillis omnis oriundi; rami superiores inflorescentiam diffusam formantes, inferiores breviores; folia utrinque subtiliter strigosa; involucri basis et pedunculi pars distalis pilos paucos breves ferentes; phyllaria exteriora ciliata, interiora minute puberulentia; folia in foliola 3 lanceolata vel ovata, acuta vel attenuata, serrata pinnatisecta, foliolis lateralibus (vel rarissime omnis) interdum pinnatifidis; foliolum terminale multo longius, 2–5 cm longum (basi petioliformi ad 5 mm longa inclusa), 5–12 mm latum, utroque latere dentibus medianis 2–6 munitum; foliola lateralia sessilia vel breve petiolulata, quam terminalia dimidio minora, paullo angustiora, basi latiora, dentibus paucioribus; folia floralia bracteiformia, elliptica, integra, 1–4 cm longa; rami superiores 10–20 cm longi, semel aut bis furcati, capitulis solitariis vel quoque ramo 2–3, pedunculis filiformibus (2–) 4–10 cm longis; capitula sub anthesi 8–10 mm lata (ligulis patentibus mensa), 3.5–4.5 mm alta; involucrum campanulatum, basi rotundata vel subtruncata pallidum et carnosulum; phyllaria exteriora 5–8, 1.5–3 mm longa, linearia vel sub apicibus acutis induratis paullo ampliata; phyllaria interiora ovata vel lanceolata vel elliptica, 2.5–3.5 mm longa, 0.7–1.3 mm lata, viridi-brunnea, costa fuscata, marginibus latis membranaceis pallidis, apicibus obtuse acuminatis; flores radii neutri sterilesque ca 5, ovario rudimentario

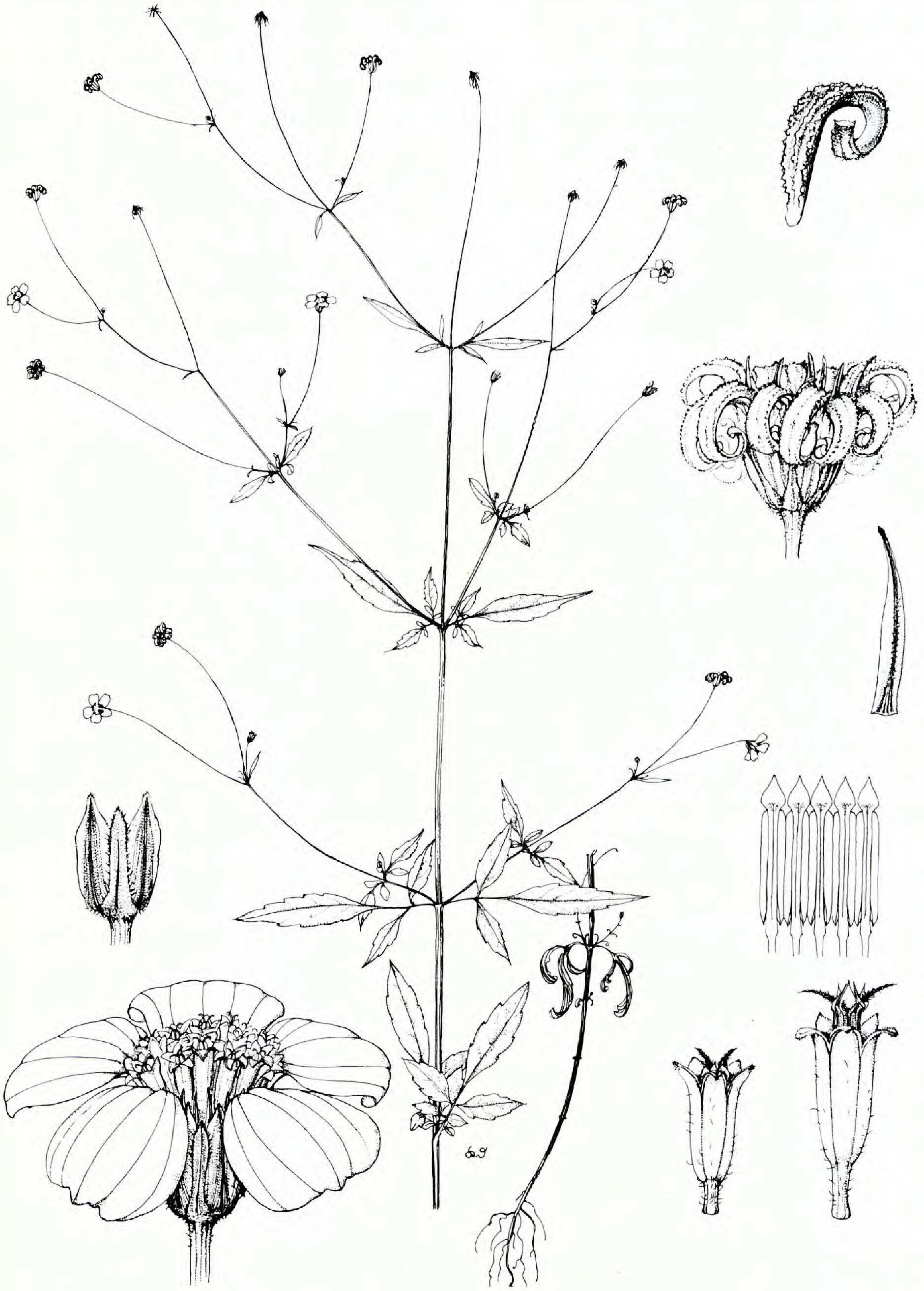

FIG. 22. *Bidens subspiralis* (*Feddema 2218*, type). Flowering and fruiting plant, X ½; fruiting head, flowering head, and detail of involcure, X 5; long and short disk-corollas, disk-achene, and pale, X 7.5; anthers, X 15.

2.5 mm longo vel breviore; ligulae albae, siccatae brunneo-lineatae, suboblongae, 3–3.5 mm longae, 2–3 mm latae, basi late rotundatae, apice subtruncatae dentatae; flores disci ca 15–20, corollis flavis, 2.7 (vel 3.7) mm longis, tubo brevi piloso, fauce campanulata, lobisque acutis triangularibus 0.7 mm longis; antherae purpureo-brunneae, 1.3 mm longae, basi auriculatae, appendicibus ovatis acutis 0.5 mm longis; styli ramuli 1.2 mm longi, applanati, ad apicem pilosum caudato-appendiculatum attenuati; achaenia lineari-fusiformia vel -clavata, 6–7 mm longa, 0.5–0.9 mm lata, nigrescentia, apice paullo angustata, truncata, tota longitudine valde dorsi-ventraliter compressa, distaliter in annulum vel cochleam laxam extrinsecus contorta; achaenii facies exterior rotundata, laevis, interior subplana, late bisulcata, marginibus porcaque acuta centrali tuberculata; pappus nullus; paleae subulatae 3 mm longae, costa brunnea, apicibus attenuatis; receptaculum 1–1.7 mm latum.

JALISCO: Mpio. de Tecalitlán, Mata de Bule, Sierra de los Corales, near upper limit of tropical deciduous forest with *Pseudosmodingium, Bursera, Lysiloma*, elev. 1300 m, 25 Oct 1963, *Feddema 2218* (MICH, type).

Unknown except from the type, this plant suggests a small-flowered, somewhat cut-leaved form of *Bidens pilosa*, except for the extraordinarily coiled and ornamented awnless achenes. Heads with long corollas, and those with the shorter corollas, may be found on the same plant.

Calea colimensis McVaugh, sp. nov.

Frutex arcuatus vel herba gigantea basi lignosa, caulibus 2–4 m longis subsimplicibus, inferne glabris vel per pilorum bases rigidos persistentes asperatis, ramulis hispidis, inflorescentia pedunculisque per pilos rigidos graciles ascendentes dealbatis; folia supra scabridula, subtus in venis pilos multos rigidos vitreos munita; phyllaria ciliata, cetera quasi glabra; folia ramique oppositi, tantum inflorescentiae ramuli minimi alterni vel irregulariter fasciculati; folia principalia elliptico-ovata vel -lanceolata, 8–14 cm longa, 2.5–6 cm lata (ramorum lateralium florentium saepe dimidio minora), sensim acuminata saepeque falcata, triplinervia, ad basin e medio vel infra sensim rotundata vel attenuata, marginibus remote denticulatis vel serrulatis, in petiolos 5–15 mm longos cuneatim decurrentibus; inflorescentia subcorymbosa vel rotundata, compacta, pauciramosa, ad 50–75-cephala, ramulis subnudis e nodis foliosis terminalibus 1–2 orinudis, capitulis latis, 8 mm altis, compressis 6–8 mm latis, pedunculis 2–10 mm longis; involucrum late campanulatum 5 mm longum, 3–4-seriatum, basi rotundatum; phyllaria 20–30, alboviridia, basi rigida, apicibus membranaceis; phyllaria exteriora gradatim breviora, extima brevissima 5–8 obtusa vel subacuta, mediana elliptica vel oblonga 1–2.5 mm lata, marginibus membranaceis apicibusque obtusis tenuibus; phyllaria interiora interdum augustiora, subacuta; bracteae lineares quam phyllaria angustiores plerumque aliquos disci flores marginales subtendentes, sensim in paleas transientes sed integrae non ut in paleis lateraliter dentatae; flores radii 5–9 vel nulli, ligulis (quae absunt) ut videtur flavidis, 1.5–2 mm longis, 1–1.5 mm latis, apice 3-dentatis, tubo dense piloso 2–2.5 mm longo; flores disci ca 25–30, corollis luteis vel aureis, 4.5–6 mm longis, anguste tubuloso-infundibuliformibus, externe densiuscule pilosis, lobis interne papillosis 0.6 mm longis; antherae ca 1.6–1.7 mm longae, basi auriculatae, appendicibus trullatis 0.4 mm longis; styli ramuli lineares, applanati, 1 mm longi, prope apices subacutos pilosi; achaenia 1.5–1.7 mm longa, subdimorpha, radii nigra, glabra, epapposa, dorsi-ventraliter compressa, ambitu anguste obovata, incurvata, dorso convexa, facie interiori angulata; achaenia disci obpyramidalia, leniter 4–5-angulata, crebre pilis rigidis partim bifurcatis subappressis hirsuta; pappi setae albae subulatae planae ca 20, barbellatae, 3–5 mm longae; paleae ca 5 mm longae, angustae, membranaceae, acutae vel apice subulatae, plerumque dentibus 2 grossis lateralibus munitae; receptaculum breviconicum, 1 mm latum, paleis centralibus persistentibus.

TYPE: JALISCO: Nevado de Colima, SE slopes, in fir-forest, elev. 2850 m, 2 Apr 1951, *McVaugh 11704* (MICH).

This species is evidently very closely related to *Calea integrifolia* (DC.) Hemsl., but the flower-heads are conspicuously larger than those of *C. integrifolia,* and the parts of individual disk-flowers, especially the corollas and the pappus, are consistently larger. The most easily observed difference between the two is in the ligules, which in *C.*

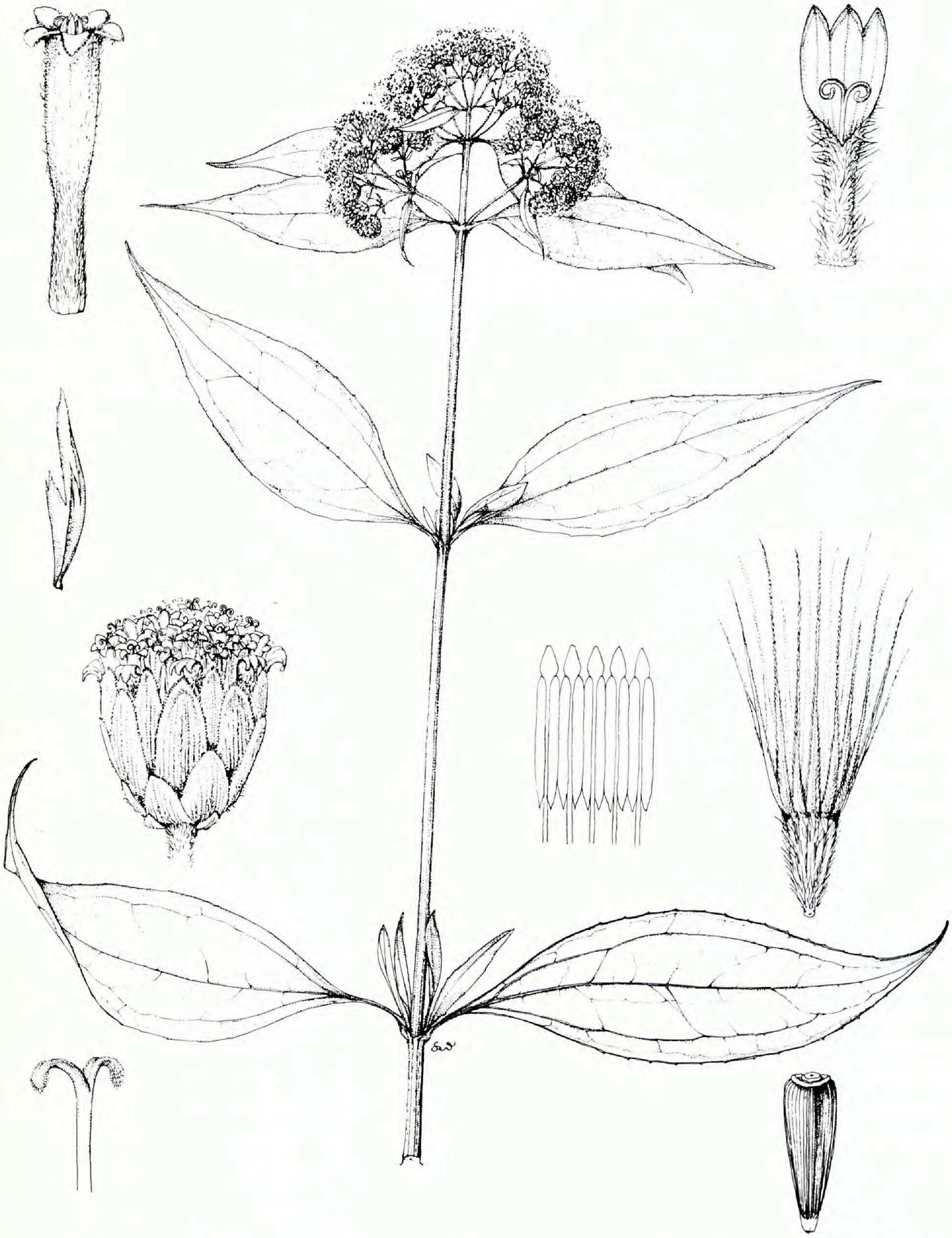

FIG. 23. *Calea colimensis* (*McVaugh 11704,* type). Flowering branch, X ½; flowering head, ca X 4; corollas and pappose disk-achene, X 7.5; anthers, epappose ray-achene, and style-tips of disk-flower, X 10; pale, X 5.

colimensis are greatly reduced or wanting; *C. integrifolia* is not well known in western Mexico, but ranges far southeast of our limits into Central America.

Additional specimens of *C. colimensis* examined:

JALISCO: Nevado de Colima, NW slopes, barranca in fir forest above El Izote, elev. 2500–2600 m, 28 Mar 1949, *McVaugh 10086;* Nevado de Colima, northern slopes, in oak forest, elev. 2200–2500 m, 1 Apr 1951, *McVaugh 11671;* 25–30 km SE of Autlán, humid forest near summits between El Chante and Cuzalapa, elev. 2000–2250 m, 19–22 Mar 1965, *McVaugh 23101.*

Calea scabra (Lag.) Rob., var. **palustris** McVaugh, var. nov.

A varietatibus ceteris hujus speciei foliis glabris, a var. *pedunculari* pappi setis obtusis vel acutis 1.3–3 mm longis interdum breviaristatis differt; paludes habitat.

NAYARIT: Wet meadows in oak zone 6–8 km N of Compostela, elev. 800–900 m, 5 Sep 1960, *McVaugh 18732* (MICH, type); open wet areas ca 32 km SE of Tepic, 10 Aug 1960, *King 3676.*

Superficially similar to the upland varieties of *Calea scabra,* this plant is apparently restricted to marshy habitats. The herbage is always glabrous except in the inflorescence, where as in var. *scabra* the leaves are strigose or pilose beneath. Strictly speaking, the name var. *scabra* applies to a form in which the achenes are epappose; in the so-called var. *peduncularis* (H.B.K.) Rob., the pappus is usually 0.6–1 mm long, rarely as much as 2 mm.

Chrysanthellum filiforme McVaugh, sp. nov.

Annua, gracilis, erecta 10–40 cm alta radice palari, glabra (basi involucri minute glanduloso-pubescens), caulibus solitariis vel paucis, plerumque supra medio pauciramosis, quoque ramo capitula 1–2 pedunculis filiformibus 4–9 cm longis ferenti; folia alterna vel ex parte ad basin caulis rosulata, laminis in ambitu ovatis, (1–) 2–6 cm longis, in segmentis acutis linearibus integris pinnatim semel aut bis dissectis, segmentis ultimis 2–10 mm longis, 0.8 mm latis vel angustioribus; rhachis 0.5–0.8 mm lata; foliorum caulinium petioli 3–10 (–25) mm longi, basalium 2–5 cm longi, quam laminae saepe longiores; capitula erecta, 1.3–1.8 cm lata (ligulis patentibus mensa), sub anthesi 6–10 mm alta, bicoloria, radiis aurantiacis sed disco castaneo-rubro; involucrum castaneum, campanulato-infundibuliforme, 4–5 mm altum, phyllariis interioribus 8–9 distinctis, subaequalibus, membranaceis, glabris, coloratis, lanceo-ovatis vel ellipticis vel obovatis, obtusis, 1.3–2 mm latis, marginibus latis subhyalinis; phyllaria exteriora 5, appressa, lanceo-subulata, 1.5–2.5 mm longa, basi gibba, glanduloso-puberulentia; flores radii 9–15, fertiles, ex parte phyllariis interioribus, parte bracteis linearibus coloratis, inter phyllaria et paleas intermediis, subtenti; ligulae obovato-cuneatae, 4–7 mm longae, apice obtusae vel emarginatae, in siccitate pallidae, venis 4 (–6) brunneis; tubus 0.5 mm longus, glaber; styli ramuli 0.5 mm longi; flores disci 20–30, hermaphroditi sed steriles, corollis castaneis glabris 4–5.5 mm longis, tubo angusto 1–1.5 mm longo, fauce cylindro-campanulata, lobisque crassis atrocastaneis ovatis obtusis, 0.3–0.4 mm longis; antherae basi obtusae, appendicibus obtusis inclusis 1.5–1.8 mm longae, styli ramuli erecti, 1.3–1.6 mm longi, papilloso-hispiduli, apicibus attenuatis; achaenia radii plerumque 8 (cetera non maturantia), pallide brunnea, 3.5–4 mm longa, clavata subteretiaque, paullo incurvata, 1–1.3 mm crassa, glabra laeviaque vel raro distaliter tuberculata, apice rotundata, breve coronata, basi paullo incrassata suberosaque, longitudinaliter 6–10-sulcata, porcis obtusis; pappus nullus; florum disci ovaria rudimentaria linearia 1.5–5 mm longa, versus centrum capituli longitudine sensim crescentia, paleis filiformibus persistentibus 3–4 (–5.5) mm longis, saepe quam ovariis paullo longioribus, subtenta; receptaculum convexum.

TYPE: MICHOACAN: Summit of Cañón el Marqués, ca 8 km N of Nueva Italia, ungrazed hillsides in *Bouteloua* grassland, elev. 450–500 m, 19 Sep 1958, *McVaugh 18030* (MICH).

Unknown except from the type-locality, this species differs markedly in habit and in leaf-form from any other *Chrysanthellum* known to me. In the widespread *C. americanum* (L.) Vatke there is some tendency toward sterility of the disk-flowers, and

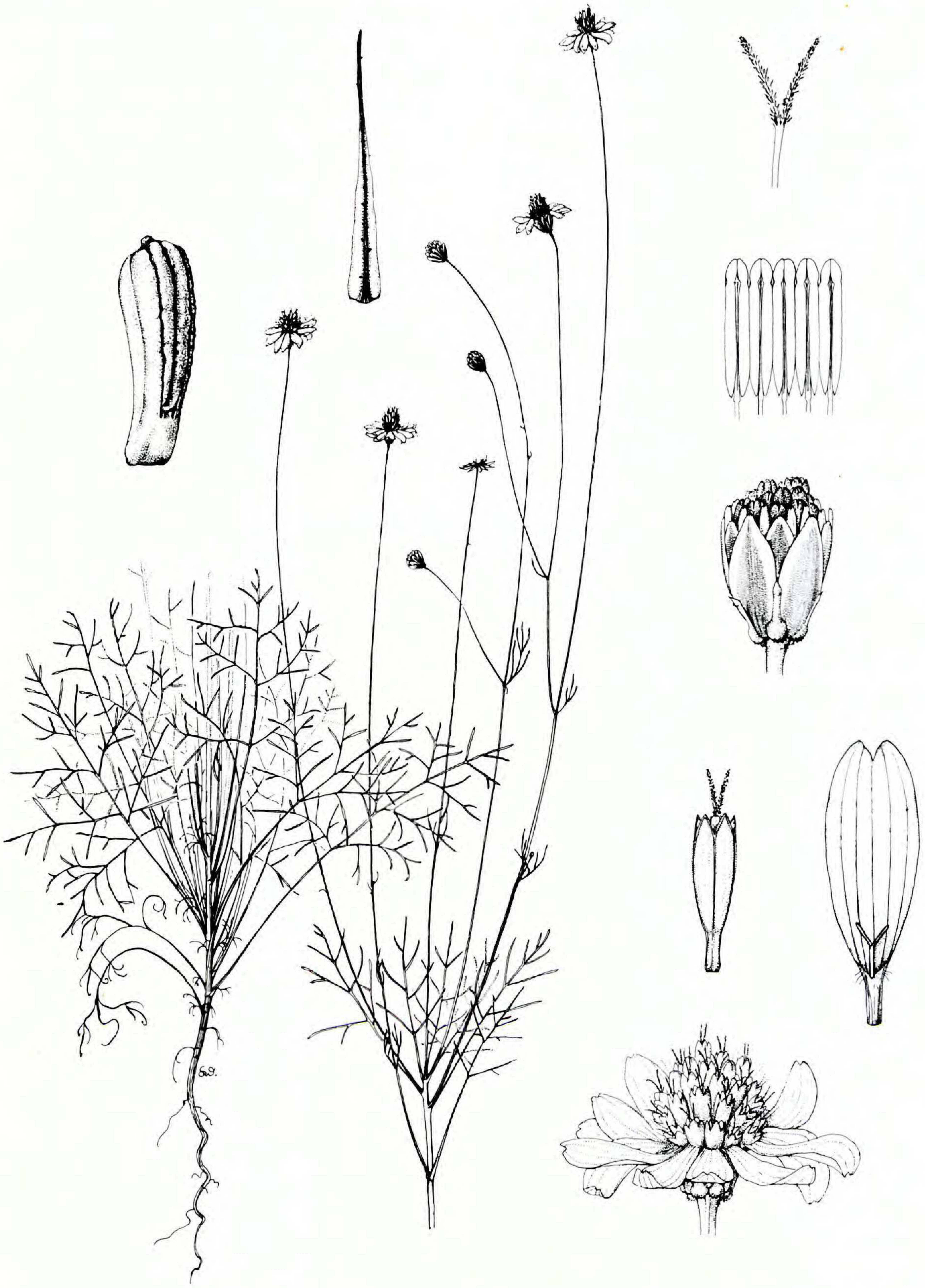

FIG. 24. *Chrysanthellum filiforme* (*McVaugh 18030,* type). Flowering and fruiting plant, X ½; flowering head, X 2; head in bud showing involucre, X 3; corollas, X 5; achene, and style-tips of disk-flower, X 7.5; anthers, and pale, X 10.

apparently the affinities of *C. filiforme* are with *C. americanum,* not with *C. mexicanum* Greenm., which is common in various parts of Nueva Galicia.

Dyssodia porophyllum [as *porophylla*] (Cav.) Cav. An. Ci. Nat. 6: 334. 1803. *Pteronia porophyllum* Cav. Ic. 3: 13. *pl. 225.* 1795.

The specific epithet has been spelled *porophylla* by many authors, first by Cavanilles himself when he made the new combination under *Dyssodia,* and soon thereafter by Lagasca (1816) and DeCandolle (1836). This can be justified under the Code only if it can be shown that the original spelling, *porophyllum,* was published because of a "typographic or orthographic error." Although the possibility of such an error cannot be ruled out, it seems much more likely that Cavanilles first intended to use *Porophyllum* as an epithet in apposition, and later changed his mind, without realizing that under 20th Century rules of nomenclature he would not have the right to do so.

Cavanilles' original specimen (at MA; MSC photo 4808), representing a plant cultivated at the Royal Botanical Garden in Madrid in 1793, is labelled *"Pteronia porifolia,"* suggesting that at first he contemplated still a third form of the epithet. Another specimen from the Madrid Garden, cultivated in 1803 (i.e. the same year as the publication of *Dyssodia "porophylla"*), bears the name *"Dyssodia porophyllum* H[ort.] R[eg.]," and on the same label the synonymous name *"Pteronia porophyllum* Cav. Ic. ta[b]. 225" (MSC photo 4842). This of course supports the assumption that *Dyssodia porophyllum* (in that exact form) was used at the Madrid Garden, was presumably known to Cavanilles himself, and was not invented by Willdenow or some other author. Willdenow seems to have gone back intentionally to the original spelling in using the name *Dyssodia Porophyllum* (Enum. Hort. Berol. 2: 900. 1809), as does Kunth (H.B.K. Nov. Gen. & Sp. 4: 198. 1820) in making the new combination *Boebera Porophyllum.* Rydberg (N. Am. Flora 34: 163. 1915) to cite a more recent example, used the combination *Lebetina Porophyllum,* not accepting Aven Nelson's (1909) spelling *porophylla.*

Encelia linearis McVaugh, sp. nov.

Perennis, herbacea, caulibus solitariis vel paucis, erectis, foliosissimis, 30–65 cm altis, 1–2 mm crassis, e caudice crassa lignosa oriundis; caules angulati, inferne pubescentibus, pedunculis paullo pilis brevibus appressis dealbatis; phyllaria hirsutula; folia sparsa, numerosissima (100–200), linearia, valde revoluta, calloso-denticulata sed ut videtur integra, (1–) 2–4.5 cm longa, 0.7–1.5 mm lata, sessilia, apice obtusa, supra glabra vel scabridula, subtus alba denseque brevipilosa, area inter margines revolutos pilis obtecta, nervo medio glabro, pallido, basi ampliato et angulo in caulem decurrenti; capitula solitaria vel pauca, caulem et ramos superiores rigidos valde ascendentes terminantia, pedunculis 8–15 cm longis, 1–2 mm crassis, sub capitulis ampliatis; capitula sub anthesi non visa, verisimiliter brevicampanulata, fructifera ca 1 cm lata; phyllaria ca 11–15, lanceolata, obtusa vel attenuata, 5–6 mm longa, 1.5–2 mm lata, exteriora (ca 8) angustiora, breviora, obtusa, 1–1.5 mm lata; flores radii ut videtur steriles, achaeniis juvenilibus trigonis, ligulis angustis ca 1 cm longis; flores disci 50 vel ultra, corollis 3.7 mm longis; antheris appendicibus inclusis 1.7–2 mm longis; achaenia disci paullo immatura 2.5–3 mm longa, planissima, ambitu obovoidea, versus apicem ciliata, quaque facie obscure angulata, aristam debilem ad 1 mm longam quoque margine ferentia; squamellae nullae; paleae conduplicatae ca 5 mm longae, scariosae, rigidae, acuminatae, deciduae; receptaculum valde convexum, 3–6 mm latum, 2–4 mm altum.

TYPE: JALISCO: Rocky hills, grassy openings in dry oak forest 6–7 km NW of Cuautla, road to Los Volcanes, elev. 1700–1750 m, 9 Oct 1960, *McVaugh 19995* (MICH). Unknown except from the type collection.

This plant resembles no other Mexican Composite known to me. It is assigned to *Encelia* because of the narrow alternate leaves, the very flat disk-achenes with 2 weak awns, and the presumed sterility of the ray-flowers.

Galinsoga mollis McVaugh, sp. nov.

Herba annua (?) 1.5-metralis, multiramosa, omnibus partibus fere hirsutula, pilis gracillimis vitreis attenuatis multicellularibus, caulium petiolorumque longioribus 2–3 mm longis, foliorum plerumque 1 mm longis vel brevioribus, ramulorum

pedunculorumque brevioribus, appressis; phyllaria ciliata, cetera glabra; folia et rami majores oppositi, inflorescentiae ramulis parvis saepe alternis; folia tenuia, triplinervia, elliptico-lanceolata, 5–15 cm longa, 2–3.7 cm lata, sensim longiacuminata, ad basin attenuata vel paullo rotundata, petiolis 5–15 mm longis, marginibus remote calloso-denticulatis; folia superiora et ramulorum superiorum multo minora, subsessilia,

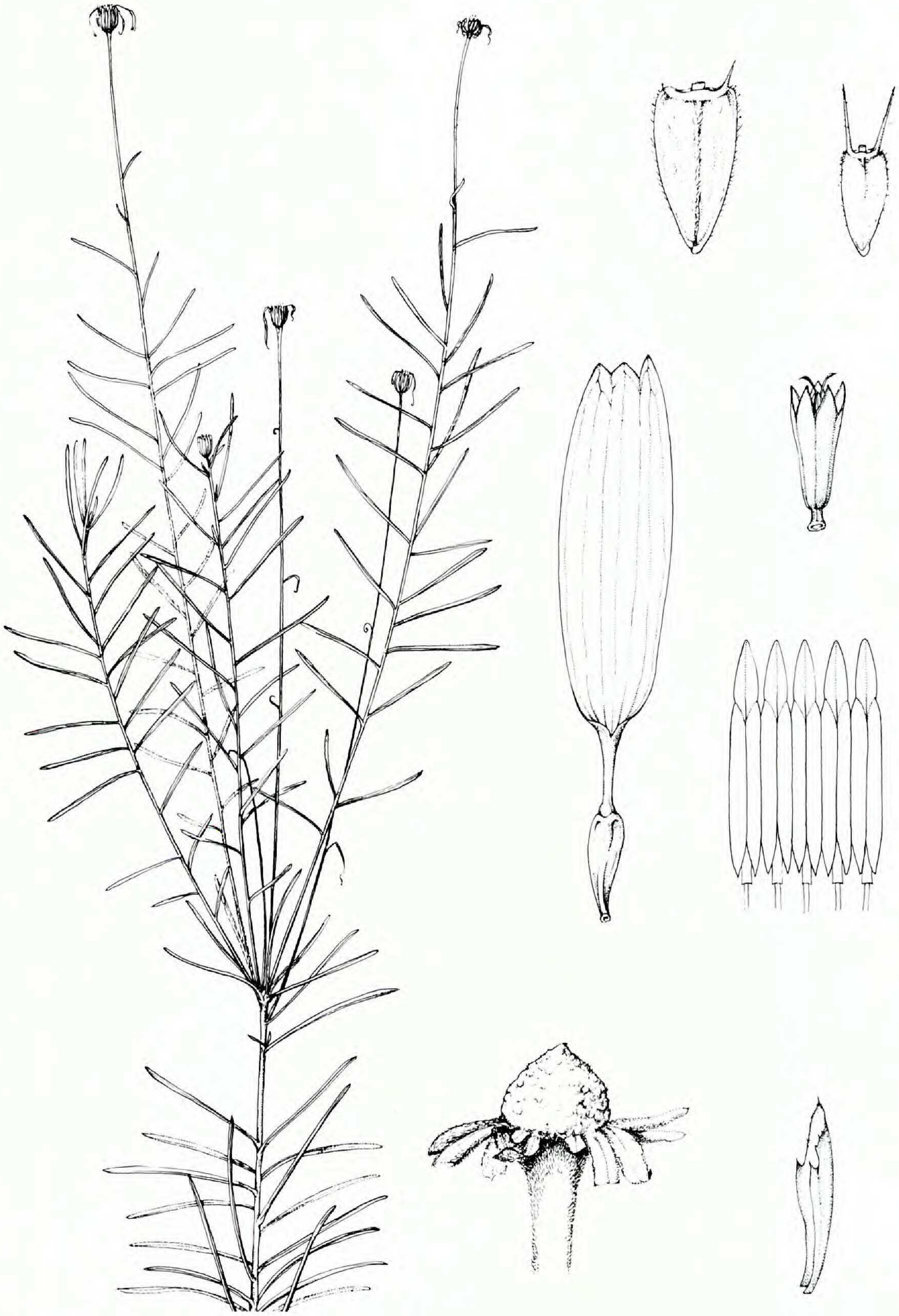

FIG. 25. *Encelia linearis* (*McVaugh 19995*, type). Terminal portion of over-mature fruiting plant, X ½; over-mature receptacle, X 2.5; corollas, and pale, X 5; immature achenes, ca X 5–6; anthers, ca X 17.5.

lanceolata, 1–5 cm longa; inflorescentia diffusa paniculiformis, plantae dimidium superius obsidens, ramis majoribus ad 50 cm longis, capitulis quoque ramo paucis vel ad 10, pedunculis 1.5–4 cm longis; capitula 1.5–2 cm lata (ligulis patentibus mensa), radiis exceptis subglobosa, 6–7 mm alta; involucrum basi late rotundatum vel centro depressum, ca 4 mm altum, 6–7 mm latum; phyllaria 13–16, basibus rigidis, striatis, marginibus apicibusque obtusis membranaceis, exteriora gradatim breviora, extima ca 4–6 quam ceteris multo minoribus 1.5–3 mm longis; phyllaria interiora ca 8, radii achaenia subtendentia, late elliptica vel obovata, dorso valde convexa, 2–2.5 mm lata, cum bracteis 2 adjacentibus lineari-oblongis, obtusis, integris, 0.5–1 mm latis, et achaenio incluso *Galinsogae* modo secedentia; flores radii ca 8, ligulis albis 4–7 mm longis, 2.5–3.5 mm latis, apice 3-dentatis, tubo hirsuto 2 mm longo; styli ramuli exserti 1 mm longi, laeves, lineares, adaxiale applanati sulco mediano; flores disci plurimi (125–150), corollis flavidis 2.5–2.8 mm longis, basi pilosis, tubo angusto 1 mm longo, fauce subcylindrica, lobis ovato-triangularibus 0.5 mm longis, utrinque papillosis; antherae 1 mm longae, basi subauriculatae, appendicibus tenuibus ovatis acutis 0.3 mm longis; styli ramuli 0.7 mm longi; achaenia 1.1–1.5 mm longa, glabra, nigrescentia, epapposa, subdimorpha, clavata vel obpyramidalia, apice truncata, basi carpopodio pallido abrupte incurvo instructa, radiorum paullo compressa, incurva, dorso (abaxiale) convexa, ventro angulata, disci clavato-columnaria, 4–5-angulata; paleae membranaceae lineares 2.5 mm longae, apice erosae, obtusae, plerumque dentibus 2 (–1) lateralibus munitae; receptaculum conicum, 1.5–2 mm altum et subaequilatum, paleis saltem interioribus persistentibus.

TYPE: 20–22 km S of Talpa de Allende, headwaters of a west branch of Río de Talpa, steep mountainsides in pine forest, elev. 1200–1450 m, 28–30 Mar 1965, *McVaugh 23300* (MICH). Unknown except from the type-collection.

The separation of a phyllary with 2 attached lateral bracts or inner phyllaries, and a pale within, the whole inclosing one of the peripheral achenes and falling with it, was noted long ago in this genus by Rafinesque and by DeCandolle. More recently it was described by Blake as a unique attribute of *Galinsoga.* In fact the same condition may be noted in a few species of *Tridax,* which is maintained as a genus distinct from *Galinsoga* perhaps more because of tradition than for taxonomic reasons.

The differences between the newly described *Galinsoga mollis* and the common *G. parviflora* Cav. may be expressed as follows:

1. Rays usually about 5; disk-flowers about 25, their corollas 1.2–1.6 mm long; pappus often present. *G. parviflora.*
1. Rays usually about 8; disk-flowers 125–150, their corollas 2.5–2.8 mm long; pappus none in ray or disk. *G. mollis.*

Guardiola mexicana Humb. & Bonpl., var. **angustifolia** (A. Gray) McVaugh, comb. nov. *Guardiola tulocarpus* var. *angustifolia* A. Gray, Proc. Am. Acad. 22: 423. 1887. *Guardiola angustifolia* (A. Gray) Rob. Bull. Torrey Bot. Club 26: 235. 1899.

This plant, unknown except from the *barranca*-systems of the Río Grande de Santiago in Jalisco, is excluded from *Guardiola tulocarpus* because of the lack of a caruncle on the achene. Superficially it seems quite different from *G. mexicana,* which has broader and often hastately toothed leaves, ray flowers 2–4 (as against 1–10). None of these characters is entirely diagnostic, however, and the two taxa are so much alike in other characters of involucres, flowers, and achenes, that it seems unrealistic to treat them as separate species.

Hydropectis stevensii McVaugh, sp. nov.

Annua, erecta, glabra, ramosa, 10–25 cm alta, e radice brevi erecta; folia ramique oppositi, vel folio summo vel bractea pedunculi interdum alterna; folia 2–5 cm longa, linearia integraque, vel pinnatipartita lobis linearibus ad 1 cm longis utroque latere 1–2; laminae, vel foliorum lobatorum lobi rhachidesque 1 (–2) mm latae, apicibus callosis obtusis; foliorum bases paullo dilatatae brevissimeque connatae; glandulae

foliares rotundae, diametro 0.1–0.2 mm, immersae, plurimae, nervi medii utroque latere uniseriales; capitula usque ad 10–25, vel in quoque ramo principali 10–25; ramificatio cymosa, capitulis centralibus vetustioribus a ramis junioribus multo superatis; capitula vulgo terminalia, pedunculis brevibus 5–15 mm longis, sub capitulis ampliatis, nudis vel unibracteatis, bractea lineari obtusa; capitula hemisphaerica, ut

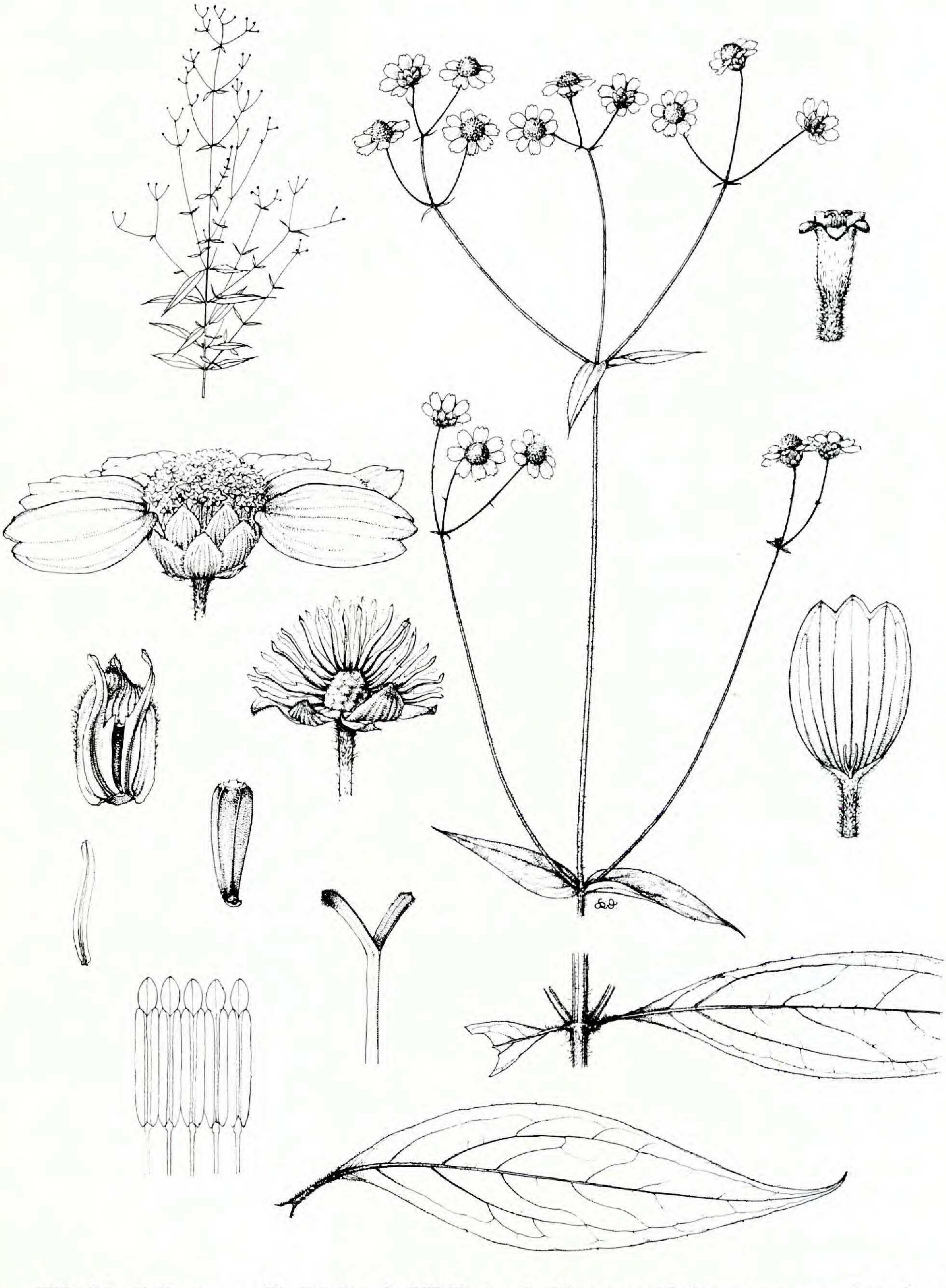

FIG. 26. *Galinsoga mollis* (*McVaugh 23300,* type). Diagram of inflorescence, greatly reduced; leaves and terminal portion of inflorescence, X ½. flowering head with 2 rays removed, X 2.5; over-mature fruiting head with pales partly removed, X 3.5; disk-corolla, X 6; ray-corolla, X 3; inner phyllary with attached lateral pales and included achene, and detached central pale below, X 5; achene, X 10; anthers and style-branches, X 15.

videtur discoidea, ligulis minutis; involucrum crateriforme, phyllariis 5 subaequalibus, distinctis, elliptico-obovatis, 3–4 mm latis, omnino membranaceis, parallelinerviis sed nervo medio haud manifesto, apicibus tenuissimis erosis purpurescentes late rotundatis; phyllaria eglandulosa, vel prope apices nervorum glandulis paucis angustissime linearibus elongatis instructa; flores marginales ca 20–23, feminei fertilesque, biseriati, corollis pallide flavidis, tubo angusto ligulaque elliptica 0.5 mm longa inclusa 1.3–1.5 mm longis; flores disci centrales 30–40, corollis flavidis subcylindricis 1.5 mm longis, lobis 4–5 ovato-triangularibus 0.3 mm longis; antherae albidae, basi obtusae, appendicibus breve ovatis inclusis 0.5 mm longae; styli ramuli 0.3 mm longi, ex antheris vix exserti

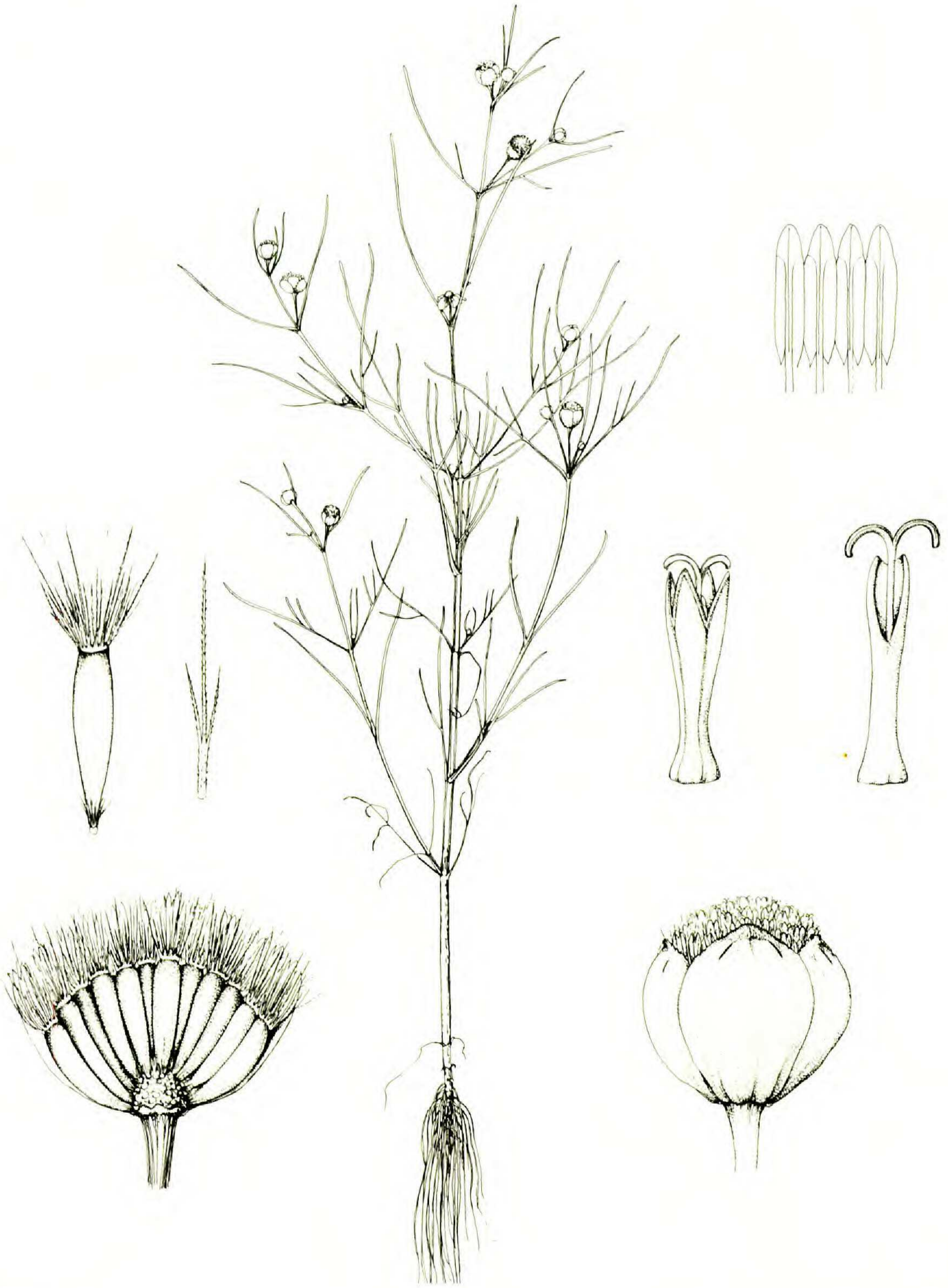

FIG. 27. *Hydropectis stevensii.* Flowering and fruiting plant, X ½ (*McVaugh 17611*). Flowering head, and fruiting head with flowers partly removed, X 5; achene, X 7.5; detail of pappus-bristle, X 12.5; corollas, X 15; anthers, X 25. All details from the type (*McVaugh 17078*).

paullo applanati, elliptici, obtusi, vix papillosi, lineis stigmaticis marginalibus ad basin extensis; achaenia 2.3–2.5 mm longa nigrescentia, clavata, teretia vel paullo compressa, striata, basi pilis bifurcatis appresse strigosa; pappi squamellae ca 15–20 valde inaequales angustae, aristatae vel plerumque in aristis setiformibus 3–5 divisae, aristis longioribus 1.3–1.5 mm longis; receptaculum late conicum 1.5 mm latum, per cicatrices prominentes achaeniorum asperatum, vetustate phyllariis laxe reflexis pallidis circumcinctum.

Species comiti Warren Douglas Stevens (1944-), qui mecum anno 1970 per terram mexicanum lustravit, nominavi.

JALISCO: In mud and shallow water, depressions in level grassland, along the Ojuelos-Aguascalientes highway near km 45, E of Tacubaya, elev. 2000–2050 m, 17 Aug 1958, *McVaugh 17078* (MICH, type); depressions in grassland, 13 mi [25–26 km] W of Lagos de Moreno, elev. 1900 m, 1 Sep 1958, *McVaugh 17611.*

GUANAJUATO: Depressions in grassland, 11–12 km W of Dolores Hidalgo, elev. 1950 m, 9 Nov 1970, *McVaugh 24074.*

Originally discovered during the unusually wet summer of 1958, this species was not found again until Mr. Stevens detected it growing with *Jaegeria glabra* and other Compositae in the Guanajuato grasslands in 1970. Apparently it, like other plants of similar habitat preference, can survive a series of unfavorable seasons when rainfall is so light that the seasonal pools in the grassland are not formed.

One other species of *Hydropectis, H. aquatica* (S. Wats.) Rydb., is known from western Chihuahua. It is said to have discoid 10–12-flowered heads and achenes 6–8 mm long. It was originally described as a species of *Pectis.* The 2 known species of *Hydropectis* agree in having the marginal flowers of the disk tubular or with very short ligules (not with showy ligules as in *Pectis*), in having short obtuse styles (as in *Pectis* but not in the group that includes *Tagetes, Dyssodia* and related genera), and in the aquatic or subaquatic habitat. I originally thought that *Hydropectis stevensii* might represent an aberrant species of *Dyssodia*, and I am indebted to Dr. John L. Strother for reminding me of *Hydropectis.*

Jaegeria sterilis McVaugh, sp. nov.

Herba erecta, verisimiliter annua, 10–20 cm alta, ramosa, ramis superne cymose furcatis; caules pilosi, pilis pallidis, appressis, debilibus, multicellularibus, pedunculis per pilos similes ad 1 mm longos paullo dealbatis; phyllaria dimidio proximali grosse pilosa, pilis marginalibus attenuatis rigidioribus ad 1 mm longis fere usque ad apices munita; folia sessilia, connato-perfoliata (foliorum principalium basi vaginanti 1.5–2 mm lato), subtus manifeste pallidiora, tota fere glabra sed pilis longis marginalibus pilisque paucis superficialibus instructa; laminae ovato-lanceolatae (vel superiores lanceolatae inerioresque oblongo-ellipticae), 1–3.5 cm longae, (3–) 5–15 mm latae, basi rotundatae, ad apices obtusos attenuatae vel inferiores obtusae, marginibus principalium saltem denticulatis; inflorescentia diffusa, caule plerumque ad nodum tertium vel quartum in pedunculum 3–6 cm longum terminanti, pedunculo mox ramis axillaribus 1–3-plo furcatis superato, capitulis itaque ad 30 vel ultra (in plantis parvis paucis), 1–1.5 cm latis (radiis extensis mensis), sub anthesi 4–6 mm altis, fructiferis 6–8 mm altis; involucrum basi rotundatum vel statu fructifero subtruncatum; phyllaria ca 8 (6–9), basi unita sed non imbricata, appressa, lanceolata, acuta, 3–4.5 mm longa, versus basin fimbriato-ciliata, alis interioribus 2–2.5 mm longis, ciliatis, apice abrupte rotundatis; flores radii tot quot phyllaria, neutri vel feminei, plerumque steriles, ligulis flavis oblongo-ellipticis, 4–6 mm longis, 2.5–3.5 mm latis, obtusis, glabris, tubo 0.2 mm longo; stylus vel nullus vel ca 2 mm longus, parte indivisa quam ramis linearibus applanatis obtusis longiore; ovarium sterile 2 mm longum; achaenia rarissime maturantia; flores disci numerosi (ca 35–60), corollis flavidis 1.5–2.5 mm longis, tubo minus quam 1 mm longo, basi dilatato glabroque vel rare piloso, lobis 5 (–4) late triangularibus 0.4–0.5 mm longis, intus papillosis; antherae pallide virides, appendicibus

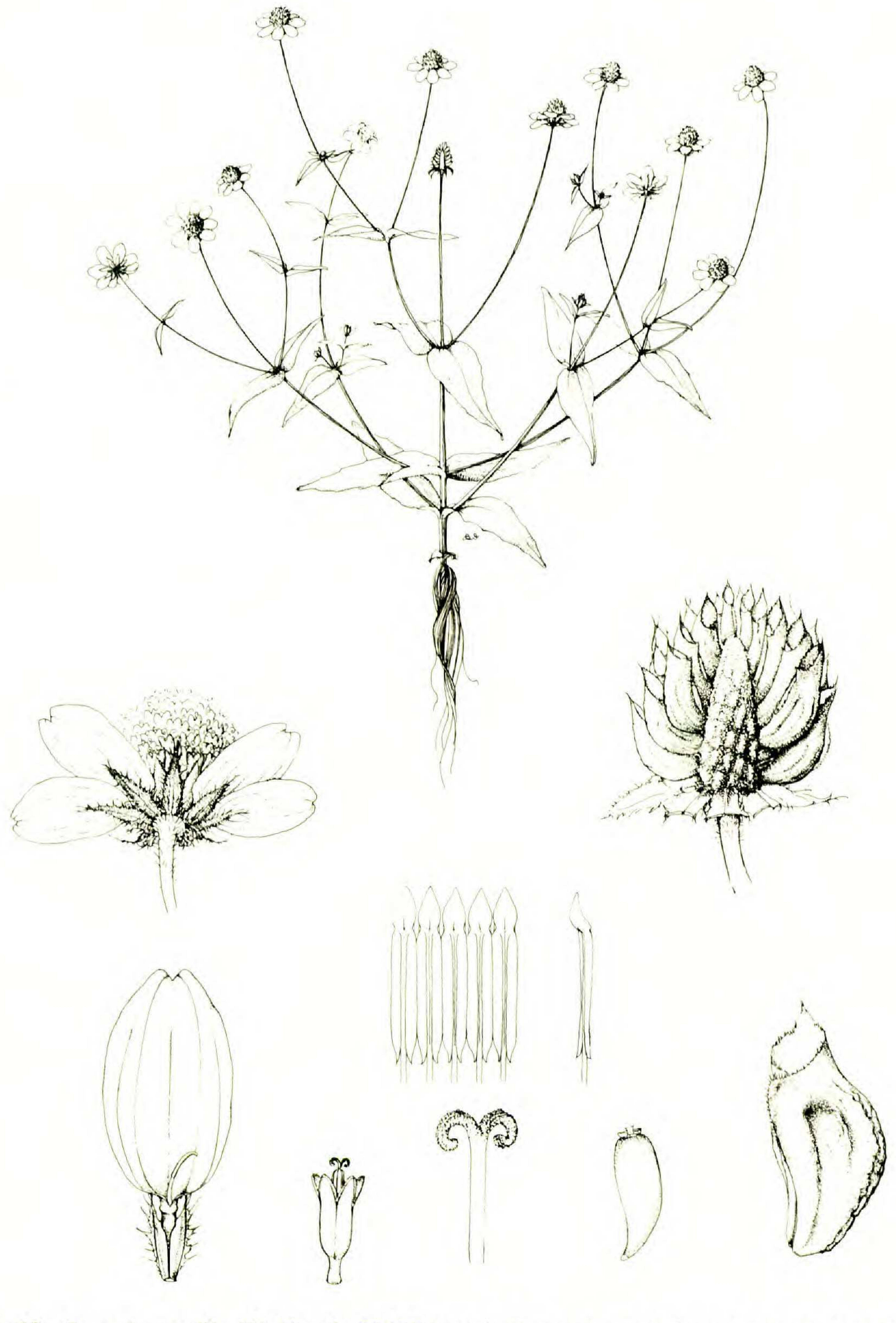

FIG. 28. *Jaegeria sterilis* (*McVaugh 20687,* type). Flowering and fruiting plant, X ½; flowering head from beneath to show phyllaries (one ray-flower removed), X 3; fruiting head with flowers partly removed, X 5; corollas, X 5; achene, X 7.5; fruiting pale, X 10; style-tips, X 15; anthers, X 20.

acutis ovatis inclusis 0.8–1.1 mm longae; styli ramuli 0.5–0.7 mm longi, recurvati, applanati, anguste linguiformes; achaenia 1.3–1.7 mm longa, epapposa, curvata, ad basin brevem gracilem attenuata, paleis omnino involuta et plerumque tecta; paleae primo coriaceae, conduplicatae, tubum curvatum formantes, corollae disci apice e tubo exserto; palea extrinsecus mox suberosa, indurata, sclerocarpium[1] curvatum obliquum formans; sclerocarpium dorso plusminusve porcatum, basi truncatum, 1–1.3 mm crassum, 2.5–3 mm longum, marginibus apicalibus tenuibus in tubum 0.5–0.7 mm crassum involutis, tubi orificio obliquo, subtruncato, abaxiale breviaristato; marginibus sclerocarpii proprii latis tenuibusque, non imbricatis sed superficiebus interioribus inter se appressis; receptaculum conicum ca 3–4 mm altum, basi 1.5 mm latum, phyllariis post anthesin rotatis, demum deciduis.

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[1] Palea indurata aucta, supra achaenium clausa et cum eo decidua. Verbum primo cl. Charles Feddema ad generis *Sclerocarpi* rationem usurpatum, sed etiam ad *Jaegeriae* rationem commodum.

JALISCO: Mountain plateau ca 6–7 km E of Tapalpa; springy meadows in pine zone, elev. 2200 m, 3 Nov 1960, *McVaugh 20687* (MICH, type). Otherwise unknown.

This species is so similar in almost every respect to other species of *Jaegeria* that there can be little doubt of its relationship to that genus. On technical characters, however, most formal arrangements of the Compositae would exclude it from *Jaegeria* because the ray-flowers are usually sterile, and place it near *Sclerocarpus* or *Aldama,* to which it seems to have little real affinity. Evidently the corky thickening of the pales throughout the head of *J. sterilis* is secondary evolutionary specialization. The pales of the outermost row of flowers (only), are similarly indurated and involute in *J. pedunculata* Hook. & Arn.

Montanoa andersonii McVaugh, sp. nov.

Frutex procerus, saepe arborescens, 4–7-metralis, caulibus 3–4 cm crassis, ramis in siccitate acute multistriatis, pilis appressis rufidulis vel brunneo-albis molliter pubescentibus; partes juniores tomentosae, coactae; pedunculi phyllariaque dense pubescentia vel pilosa; folia supra atroviridia, per pilos vix vel haud asperata, subtus pallida copioseque resinoso-globulifera, in venorum majorum axillis pilis longis grossis sed fragilibus incoloribus barbata, venis venulisque rare pubescentibus; folia principalia late ovata vel rhomboideo-ovata, triplinervia, 8–15 cm longa, 5–12 cm lata, acuminata, basi late rotundata vel abrupte angustata (marginibus fere rectis sub angulo 90° vel minore convenientibus), vel basi extrema cuneata vel paullo prolongata, subauriculata; petioli 2–6 cm longi, graciles, non marginati; margines obscure denticulatae cetera integrae vel sinuatae, vel foliorum majorum sublobatae, pari dentium deltoideorum vel acuminatorum supra medium munitae, angulisque basalibus acutis vel acuminatis; surculorum sterilium folia ovato-orbicularia, 10–20 cm longa lataque, petiolis 4–7 cm longis, laminis hexagonis (angulo terminali longiore), vel majoribus palmatim 3–5-lobatis, lobis terminalibus quadratis, a lobis lateralibus oblongis 6–8 cm longis sinubus rotundis separatis, auriculis ad 1 cm longis apice petioli instructis; folia inflorescentiae ovata vel lanceolata, 2–5 cm longa, integra vel obscure denticulata; inflorescentia composita terminalis paniculiformis, paniculis secondariis 10–15 (–25) cm longis, ramis majoribus oppositis, capitulis 10–25 in fasciculis alternatim ramosis aggregatis, pedunculis 3–10 (–20) mm longis; capitula 4–6 cm lata (radiis extensis mensa), statu fructifero 1.5 (–2?) cm lata; involucrum sub-biseriatum, hemisphericum vel demum phyllariis rotatis vel laxe reflexis; phyllaria propria 3–6, subaequalia, elliptica vel ovato-lanceolata, obtusa vel breviacuta, pilis appressis pubescentia, 3–5 mm longa, 1–1.5 mm lata; bracteae seriei interioris ca 3–6, inter phyllaria et paleas intermediae, quam phyllaria longiores, angustiores, laxius pilosae, longius acutae; flores radii ca 8, ligulis albis oblongo-ellipticis obtusis, 2–3 cm longis, 4–6 mm latis, extus rare pubescentibus et resinoso-globuliferis; flores disci ca 55, corollis flavidis 6–7 mm longis, tubo rare piloso 1.5 mm longo, fauce anguste campanulata, basi sensim angustata, distaliter dense brevipilosa, lobis ovatis acutis pilosis 1.3 mm longis; antherae glabrae atropurpureae 2.3–2.5 mm longae, basi acute auriculatae, appendicibus ovatis acutis eglandulosis 0.5–0.7 mm longis; styli ramuli 1.5 mm longi, lineares, ad apices truncato-cuspidatos praecipue dense papillosi; glandula crassa styli basin cingens; pappus nullus, sed corollae basis subpersistens, glandulam stylarem involvens et ad achaenii apicem interdum annulum formans; achaenia 2–2.5 mm longa, glabra laeviaque, nigrescentia, compressa, biconvexa vel pyramidalia, ad basin attenuata, apice truncata; paleae sub anthesi attenuatae, quam corollae disci dimidio breviores, dorso longipiloso et glandulares, sub finem anthesis rigidae cartilagineae, folliculiformes, dorso carinatae, corpore 2–3 mm longo, marginibus interioribus achaenium involventibus sed non connatis, apice acuminato arista erecta lineari-subulata 3–4 mm longa munito; paleae statu fructifero coriaceae, rigidae, 6–8 mm longae conduplicatae, corpore (statu plicato) 1.5–2 mm lato, apice subulato canaliculato saepe corpus subaequanti.

Species discipulo adjutorique William Russell Anderson (1942-), qui mecum plantas mexicanas anno 1965 collectavit, dedicavi.

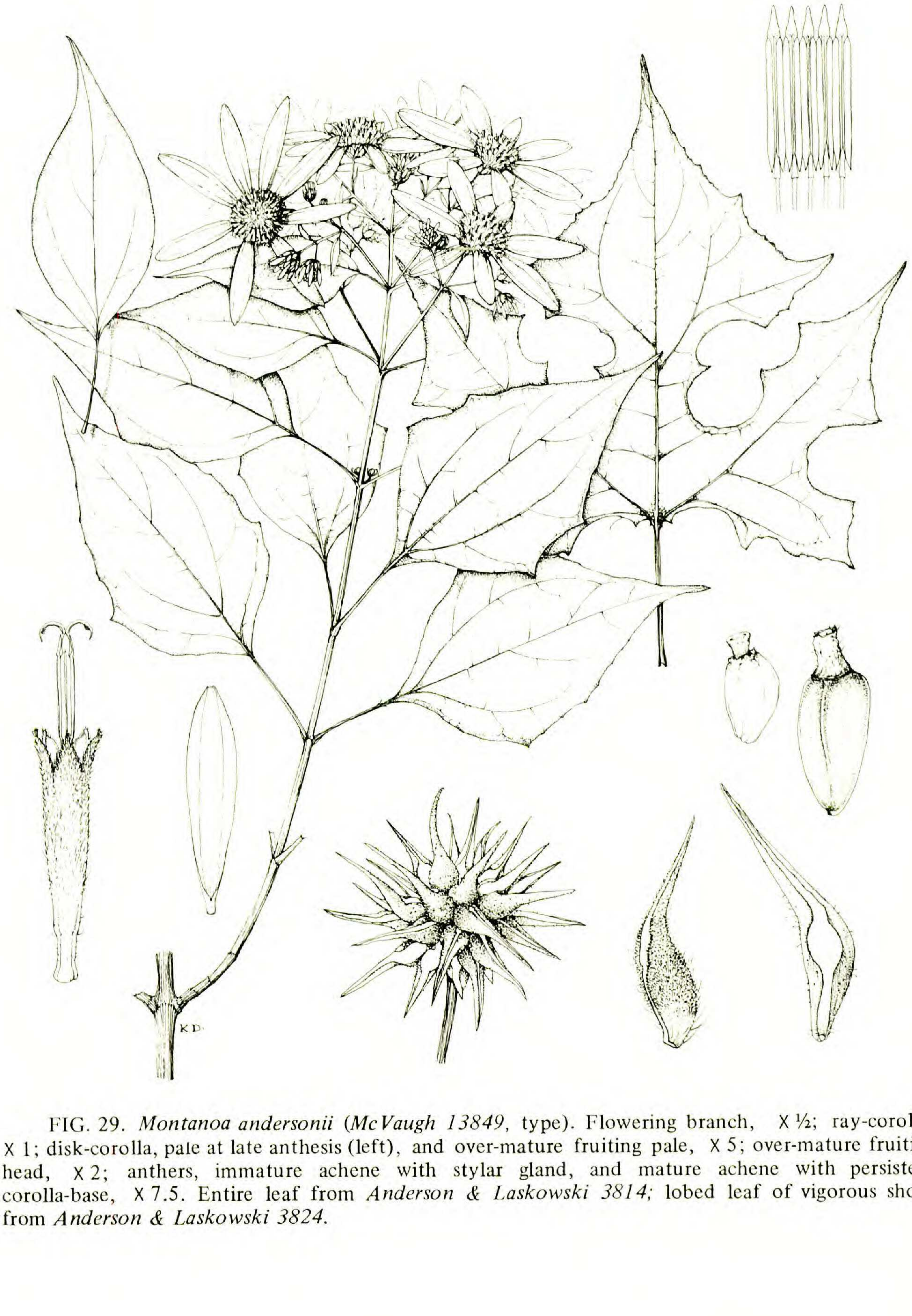

FIG. 29. *Montanoa andersonii* (*McVaugh 13849*, type). Flowering branch, X ½; ray-corolla, X 1; disk-corolla, pale at late anthesis (left), and over-mature fruiting pale, X 5; over-mature fruiting head, X 2; anthers, immature achene with stylar gland, and mature achene with persistent corolla-base, X 7.5. Entire leaf from *Anderson & Laskowski 3814;* lobed leaf of vigorous shoot from *Anderson & Laskowski 3824.*

This species is unusual in that the disk-corollas remain attached to the achenes, sometimes even until the latter mature and fall from the head. The small, narrow, rigid-tipped pales are unlike those of any other species in Nueva Galicia. In the other large-flowered species with which *M. andersonii* might be confused, the tips of the fruiting pales are much shorter than the body.

JALISCO: Sierra de Manantlán, 30–35 km SE of Autlán, on steep slopes near summits, in pine-oak forest, 2100–2450 m, 29 Sep 1966, *Anderson & Laskowski 3812, 3814, 3815, 3822, 3824;* same locality, elev. 2500 m, 2 Nov 1952, *McVaugh 13849* (MICH, type).

MICHOACAN: Coalcomán, Sierra Torrecillas, elev. 2500 m, 19 Dec 1938, *Hinton 12794;* pine-fir forests near summits ca 25 km SW of Dos Aguas, nearly W of Aguililla, elev. 2400–2500 m, 6 Mar 1965, *McVaugh 22828.*

Montanoa laskowskii McVaugh, sp. nov.

Frutex procerus 3–5-metralis, asperato-pubescens, caulibus teretibus glabrescentibus, ramulis pedunculisque arcte pilis appressis asperatulis; folia supra pilis rigidis conicis e discis pallidis erumpentibus valde asperata, subtus minute resinoso-globulifera, bullata (venulis reticulatis impressis), venis rare pilosis; phyllaria pilis arcte appressis pubescentia; folia ovata vel ovato-trilobata (surculorum palmatim 3–5-partita), triplinervia, 8–15 cm longa, 6–10 (–15) cm lata, apice (et loborum apicibus) anguste acuminatis vel subcaudatis, marginibus denticulatis vel dentatis vel sublobatis, lobis utroque latere 1 (raro 2) ascendentibus triangularibus vel prolongatis lobulatisque; laminae infra medium rotundatae, basi interdum late alatae prolongatae subamplexicaules, majores saltem plerumque ad petioli 0.5–2 cm longi apicem auriculatae, lobisque paucis (1–3) bene separatis variis e petioli marginibus oriundis instructae; inflorescentiae folia plerumque ovata, dentata, 2–4 cm lata; capitula pauciuscula (ad 20–30), in paniculis latis laxe ramosis disposita, ramis majoribus ad 25 cm longis oppositis, ramulis minoribus alternis, pedunculis nudis 2–6 cm longis; capitula 4–5.5 cm lata (radiis extensis mensa), statu fructifero 2.5–3 cm lata; involucrum inconspicuum, phyllariis radiantibus vel laxe reflexis 9–10, planis, elliptico-lanceolatis, obtusis subacutisve, 4–5.5 mm longis, 1.3–2 mm latis; phyllaria interiora in paleis transientia, pro parte cuspidata, radios arcte subtendentia, parte obtusa, paleis inter flores et bracteas interjacentibus; flores radii 8–13, albi, ligulis 1.5–2.5 cm longis, 5–12 mm latis, obovatis, obtusis, extus glandulari-puberulentibus et resinoso-globuliferis; flores disci 65–100, corollis flavidis 7–8 mm longis, subcylindricis, sursum paullo ampliatis, basi excepta dense papilloso-pubescentibus, tubo 0.7–1 mm longo, basi dilatato, fauce longa basi rotundata vel subtruncata, lobis ovatis acutis, 0.6–1 mm longis; antherae glabrae, 2 mm longae, basi acute auriculatae, appendicibus acutis sagittatis coriaceis 0.8 mm longis; styli ramuli 1.5 mm longi, cuspidato-acuminati, infra apices angustos fimbriati; achaenia glabra laeviaque nigrescentia epapposa, turbinato-quadrangularia, 3.2–4.5 mm longa, apice truncato 2 mm lata, corollae cicatrix 0.5–0.8 mm lata, margine integra vel ca 4-dentata; paleae sub anthesi membranaceae, costa pilosa, corpore ciliato obovato, truncato, quam achaenio immaturo multo longiore et id involventi, sed marginibus haud vel vix connatis, cuspide erecta floribus delapsis manifesta; paleae statu fructifero 10–11 mm longae, papyraceae, retusae, conduplicatae, aspectu laterali obovatae 3–5 mm latae, margine exteriore (plicata) rectiore, lobis apicalibus rotundatis erosis 1–2 mm altis, aristis rigidis 1–2 mm longis, basi planis 0.3–0.5 mm latis, lobis aequantibus vel paullo superantibus; receptaculum conicum, ut videtur glabrum, paleis longe persistentibus.

Species in honorem dixi Chester Walter Laskowski (1941–), amici discipulique, qui mecum humanissime generis *Montanoae* plantas siccas plurimas communicavit.

Among the large-headed species of *Montanoa* having the pales retuse, with a short erect awn between the apical lobes, *M. laskowskii* is closest to *M. pyramidata* K. Koch, a common and widely distributed species of the Pacific Slope of western Mexico. The two may be distinguished as follows:

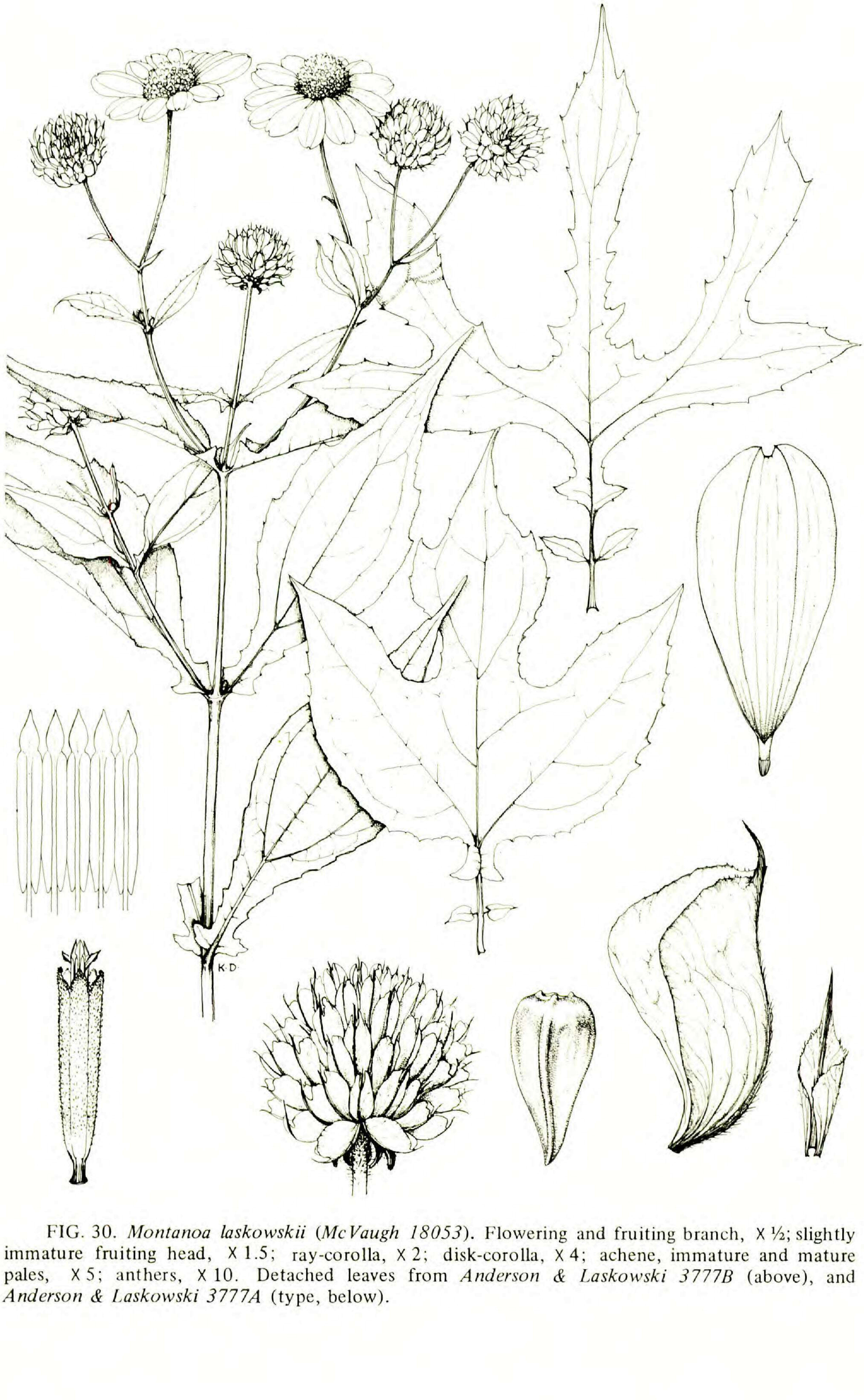

FIG. 30. *Montanoa laskowskii* (*McVaugh 18053*). Flowering and fruiting branch, X ½; slightly immature fruiting head, X 1.5; ray-corolla, X 2; disk-corolla, X 4; achene, immature and mature pales, X 5; anthers, X 10. Detached leaves from *Anderson & Laskowski 3777B* (above), and *Anderson & Laskowski 3777A* (type, below).

1. Leaves 20–50 (–75) cm long, deeply pinnately divided, with 3–5 lobes on each side; petioles 5–10 cm long, irregularly wing-margined above and often with additional lobes below; disk-flowers 150 or more; fruiting pales 12–15 mm long, the cusp 0.6–1.2 mm long. *M. pyramidata.*
1. Leaves 8–15 cm long, at most with one pair of long lobes, usually not lobed or but obscurely so; petioles 2 cm long or less, not winged but often biauriculate at the summit and with small separate lobes below; disk-flowers 65–100; fruiting pales 10–11 mm long, the cusp 1–2 mm long. *M. laskowskii.*

Specimens examined:

JALISCO: Between La Huerta and Barra de Navidad, mountain slopes in deciduous forest within sight of the ocean, elev. less than 570 m, 26 Sep 1966, *Anderson & Laskowski 3777A* (MICH, type, in flower), 3777B (sterile, with deeply 3-lobed leaves), *3777C* (with half-grown pales); same locality, same plant, 16 Dec 1966, *Anderson & Laskowski 4543* (with mature pales).

COLIMA: Low mountains in deciduous forest, in gypsum area ca 17–18 km SSW of Colima, elev. 500 m, 21 Sep 1958, *McVaugh 18053.*

Otopappus jaliscensis McVaugh, sp. nov.

Frutex debilis vel herba lignosa ramosa diffusa, 2–3-metralis, caulibus basi ad 1–2 cm crassis; partes vegetativae pilis pallidis arcte appressis 0.2–0.5 mm longis strigosae, folia supra scabridula, pilis paullo longioribus rigidis obliquis obsita; folia ramique oppositi vel summi alterni; folia ovata vel ovato-lanceolata, triplinervia, (5–) 8–18 cm longa, 2–4 (–7) cm lata, 2.5–3-plo longiora quam latiora, apice acuta vel anguste sensimque acuminata, versus basin rotundata marginibusque inde cuneatim decurrentibus, petioli parte nuda 3–10 mm longa; laminae supra basin cuneatam non profunde dentatae, dentibus utroque latere (5–) 15–25; rami prope apices 1–5-plo furcati, capitulis solitariis vel ternis, pedunculis crassis 0.5–6 cm longis, 1–2 mm crassis; capitula 3–5 cm lata (radiis extensis mensa); involucrum hemisphericum vel late campanulatum, 8–13 mm altum, ad 1.5 cm latum, 3–4-seriatum, phyllariis ca 25, exterioribus gradatim brevioribus; phyllaria exteriora (5–8) foliacea, rigida, obtusa, 7–10 mm longa, 4–7 mm lata, apicibus laxe patentibus vel reflexis; phyllaria interiora obovata vel oblanceolata, scariosa, 6–9 mm longa, 3–6 mm lata, obtusa, basi coriacea, apicibus latis, membranaceis, erosis, viridibus vel purpurascentibus; flores radii 12–15, feminei fertilesque, ligulis aureis, oblanceolatis, 12–18 mm longis, 3–5 mm latis, tubo 3–6 mm longo; styli 5–7.5 mm exserti, ramulis 2–3.5 mm longis; flores disci aurei 30–60, corollis 10–11 mm longis, tubo gracili 3 mm longo, fauce subcylindrica, lobis 5 acutis pubescentibus 1.1–1.5 mm longis; antherae nigrescentes 3–3.5 mm longae basi auriculatae, angulis pallidis, appendicibus pallidis acutis lanceolatis 0.8 mm longis; styli ramuli ca 3 mm longi, attenuati, facie interiore papillosi, exteriore antrorse hispidi; achaenia 4–5 mm longa compressa, disci bialata (ala adaxiali multo latiore) et biaristata, radii 3-alata et 3-aristata, aristis planis, ad 4 mm longis, 1 mm latis, in achaenii alis decurrentibus, arista interiore plerumque multo majore; squamellae 0.5–1.5 mm longae, inter aristas in quoque intervallo 1–2, vel saepe cum aristis continuae; paleae 10–12 mm longae, coriaceae, basi conduplicata 6–8 mm longa, plicata 1.5 mm lata, et apice rigido lineari 4–5.5 mm longo, 0.3–0.5 mm lato.

JALISCO: 3 km above (N of) La Cuesta, road to Talpa de Allende, tropical deciduous forest, elev. 800 m, 19 Nov 1960, *McVaugh 21166* (MICH, type); 8–12 km above La Cuesta, elev. 1200–1500 m, 22 Nov 1960, *McVaugh 21277;* mountains above Ahuacapán, 20–25 km SSE of Autlán, in pine forest, elev. 1500–2200 m, 22–23 Nov 1959, *McVaugh & Koelz 900, 956.*

This differs from the species of *Otopappus* known to me in the very broad tips of the inner phyllaries, the large heads with relatively few phyllaries, the large flowers, long pales with linear tips 4–5.5 mm long, and pappus-squamellae 0.5–1.5 mm long.

Otopappus koelzii McVaugh, sp. nov.

Frutex debilis ad arbores se inclinans, 3–10-metralis scandens, ramis florentibus pendentibus, caulibus basi ad 2 cm crassis, ramis divaricatis oppositis, vel inflorescentiae ramulis alternis; partes vegetativae pilis pallidis arcte appressis 0.2–0.5 mm

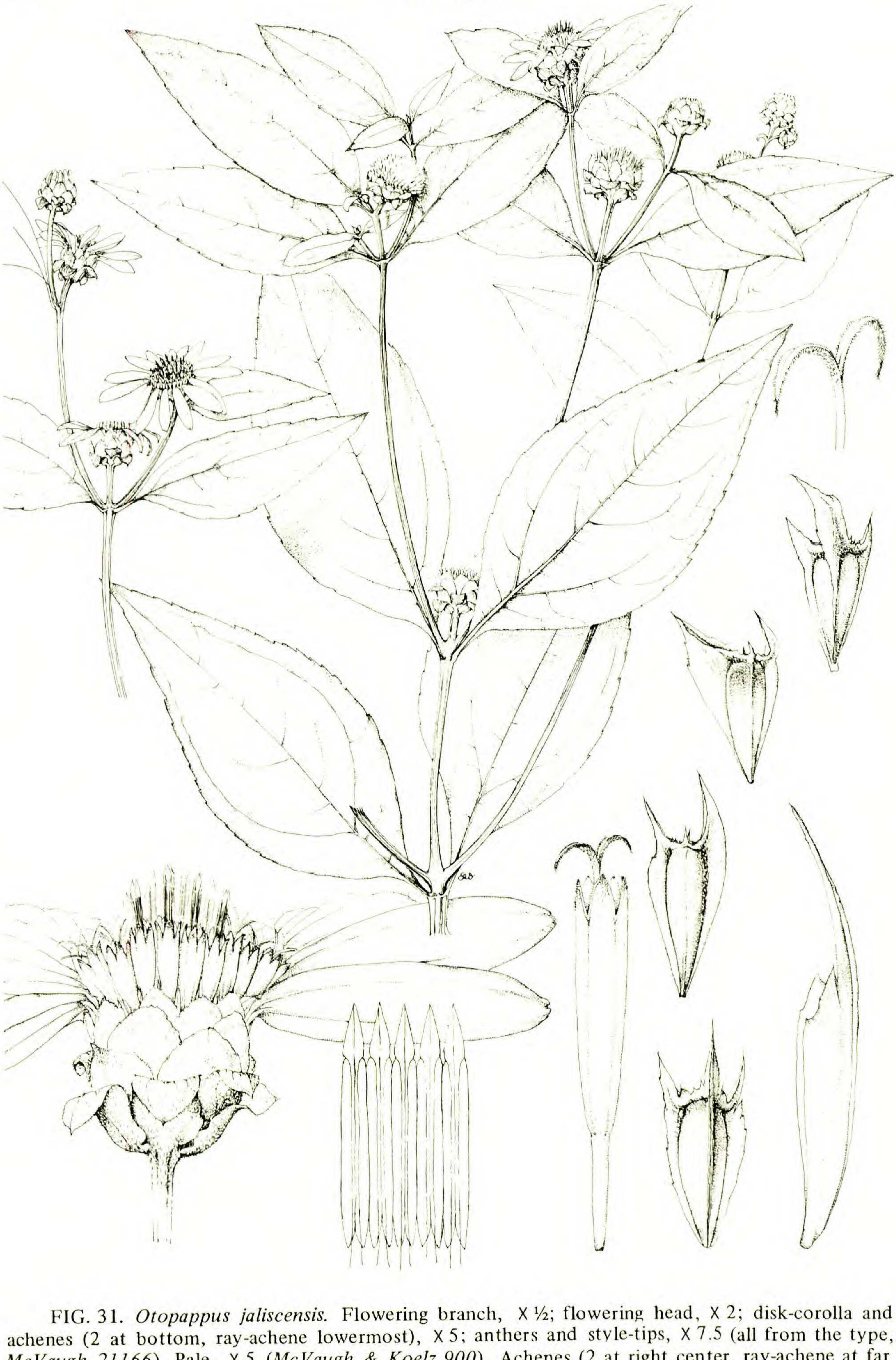

FIG. 31. *Otopappus jaliscensis.* Flowering branch, X ½; flowering head, X 2; disk-corolla and achenes (2 at bottom, ray-achene lowermost), X 5; anthers and style-tips, X 7.5 (all from the type, *McVaugh 21166*). Pale, X 5 (*McVaugh & Koelz 900*). Achenes (2 at right center, ray-achene at far right, X 5 (*McVaugh & Koelz 956*).

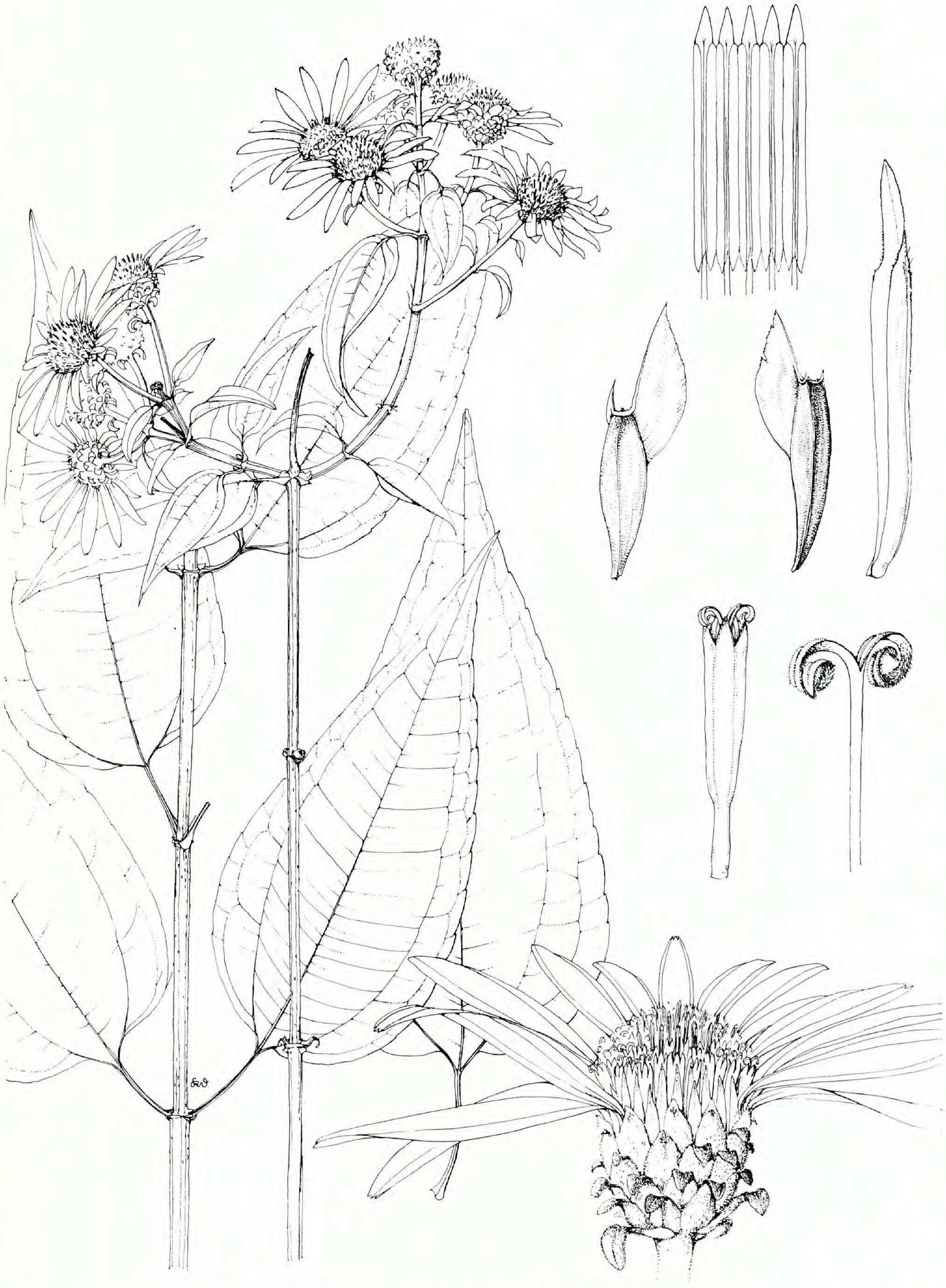

FIG. 32. *Otopappus koelzii* (*Feddema 2729A*, type). Flowering branch, × ½; flowering head, × 2; disk-corolla, disk-achene, ray-achene (right), and pale, × 5; anthers and style-tips, × 10.

longis strigosae; folia opposita, rigida, supra ad tactum asperula sed nec scabra nec rugosa, triplinervia, nervis lateralibus validis arcuatis ultra laminae medium productis, ad margines plusminusve parallelis; laminae lanceolatae vel majores ovatae, apice sensim longe acuminatae, marginibus utroque latere dentibus 10–20 non profunde serrulatis, basi rotundatis et plerumque in petiolos (0.5–) 1–2.5 cm longos subdecurrentibus; folia caulinia (tempore florendi saepe delapsa) 15–18 cm longa, 6–8.5 cm lata; folia ramealia 5–12 cm longa, 1.5–4 cm lata; capitula pauca in inflorescentiis paniculiformibus subnudis parvibracteatis, ramis divaricatis brevibus rigidis, capitulis solitariis vel ternis, terminalibus vel ramis lateralibus suffultis, pedunculis 1–5 cm longis, 1–2 mm crassis; capitula 4.5–6 cm latis (radiis extensis mensa), 10–15 mm alta, involucro hemispherico vel latiore, basi rotundato vel centro impresso, 7–10 mm alto, tempore florendi 1–2 cm lato, ca 4–seriato; phyllaria ca 50–60, exteriora gradatim breviora; phyllaria exteriora 20 vel ultra, 5–8 mm longa, corpore ovato vel lanceolato apicibusque dilatatis viridibus squarrosis, ovatis vel ellipticis vel suborbicularibus; phyllaris intima tot quot flores radii, coriacea, scariosa, oblanceolata vel linearia, 6–9 mm longa, 1.5–2 mm lata, apicibus brevibus obtusis firmis vel corrugatis; flores radii ca 13–21, feminei fertilesque, aurei, ligulis anguste elliptico-lanceolatis, 15–18 mm longis, 2–3 mm latis, subtus crebre resinoso-globuliferis, tubo 2.5 mm longo; flores disci ca 60–100, aurei, corollis 6–7 mm longis, basi glabris, tubo gracili 2–2.5 mm longo, fauce subcylindrica versus apicem paullo ampliata, lobis 5 triangularibus 1 mm longis, intus papillosis; antherae brunneae, 2.2–2.7 mm longae, angulis pallidis, basi auriculatae, appendicibus acutis triangularibus 0.6–0.8 mm longis; styli ramuli lineares 2–3 mm longi, applanati, abrupte acuti, facie abaxiali strigosi; achaenia 4.5–5.5 mm longa, 1–3-aristata, inaequaliter 1–3-alata, aristis alatis decurrentibusque; achaenia disci lateraliter compressa, biconvexa, quaque facie 2–3-acutinervata, 1–2-aristata, 1–2-alata, arista adaxiali quam altera longiore latioreque, ad 3 mm longa, 2 mm lata; achaenia radii 2-angulata, ala aristaque adaxiali majore, aristis abaxialibus 2 brevibus et anguste alatis vel valde reductis; squamellae nullae vel coronam minutam scariosam erosam formantes; paleae rigidae, 9–10 mm longae, conduplicatae carinataeque, plicatae ca 1 mm latae, apicibus attenuatis anguste triangularibus 1.5 mm longis.

Species in honorem dixi amici Walter Norman Koelz (1895–), residentis michiganensis, olim Asiae exploratoris peritissimi.

In Blake's revision of *Notoptera* and *Otopappus* (Jour. Bot. Brit. & For. 53: 202, 225–235. 1915), he distinguished the genera on the basis of the pappus only. In *Otopappus* this structure consists of two unequal and unequally winged awns, and some more or less connate intervening squamellae. In *Notoptera* the squamellae are wanting. This distinction appears to be a specious one. In the *Flora Novo-Galiciana* all the species of this alliance are referred to *Otopappus,* as in most species forms with and without squamellae may be found. In *Otopappus koelzii* the squamellae are often wanting, as in the somewhat similar species, *O. epaleaceus* Hemsl., with which it is contrasted below:

1. Leaves rugose and very scabrous above, the lower surface bristly with short erect hairs especially on the veins; ligules 5–8 mm long; disk-corollas 4.5–5 mm long; western Michoacán (east of our limits) to Guerrero. *O. epaleaceus.*
1. Leaves essentially flat and but slightly rough above, strigose on both surfaces with very closely appressed hairs; ligules 15–18 mm long; disk-corollas 6–7 mm long; southeastern Jalisco, Colima, and western coastal Michoacán. *O. koelzii.*

Specimens of *O. koelzii* examined:

JALISCO: On limestone, steep forested hills with *Brosimum,* ca 12–13 km SW of Pihuamo, elev. 500–600 m, 6 Dec 1959, *McVaugh & Koelz 1518.*

COLIMA: On gypsum and slate, low mountains in deciduous forest 17–18 km SSW of Colima, elev. 400–500 m, 25 Nov 1959, *McVaugh & Koelz 1066.*

MICHOACAN: Aquila, elev. 200 m, 28 Nov 1941, *Hinton 16046;* Cruz de Campo, 10 km SE of Aquila, in deciduous forest on karstic limestone, elev. ca 50 m, 24 Nov 1963, *Feddema 2729A* (MICH, type).

Otopappus tequilanus (A. Gray) Rob., var. **griseus** McVaugh, var. nov.

Folia supra atroviridia, rugulosa, subtus argentea, pilis rigidis appressis dense aggregatis, pilisque gossypinis obsita; laminae ovato-lanceolatae, 2.5–5-plo longiores quam latiores; inflorescentia argentea, pilis arcte appressis ut videtur coactis; phyllaria 25–35, intima elliptico-obovata apicibus tenuibus obtusis erosisque, vel subobtusis apiculatis; flores radii 9–13, ligulis 5–7 mm longis; flores disci 50–55.

NAYARIT: 8 km N of Compostela, wooded valley of Río Miravalles, elev. 900 m, 13–14 Nov 1959, *McVaugh & Koelz 640* (MICH, type); 8–10 km W of Mazatán, tropical deciduous forest with *Brosimum,* elev. 350–400 m, 17 Sep 1960, *McVaugh 19095;* mountainsides above La Cucaracha, 24–27 km S of Las Varas, high forest with *Orbignya* and *Brosimum,* elev. 300–350 m, 19–20 Sep 1960, *McVaugh 19244.*

JALISCO: River valley 3 km N of Las Palmas, forest with *Brosimum,* elev. 150 m, 19 Dec 1970, *McVaugh 25547;* 3 km SE of Puerto Vallarta, subdeciduous forest along Río Cuale, elev. 50 m, 12 Nov 1963, *Feddema 2511.*

The var. *tequilanus* differs from var. *griseus* in having the leaves green beneath, the ray-flowers 15–21, and the ligules 4–5 mm long. It is a plant primarily of the inland river-valleys of the Pacific slope of Mexico from Nayarit to Guerrero.

All known collections of var. *griseus* bear on the lower leaf-surface the fruiting bodies (1–2 mm wide) of a gill-fungus tentatively identified as *Marasmius* sp. The fungus hyphae occur at least in part as thin cottony layers on the leaf, and may indeed make the surface appear paler than it otherwise would. The silvery color of the inflorescence, however, seems to derive chiefly from the thickly matted hairs of the plant itself.

Pectis decemcarinata McVaugh, sp. nov.

Annua, prostrata vel suberecta, ad 30 cm alta vel 50 cm lata, ramis flexuosis ad 25–28 cm longis e nodis infimis oriundis; caules inferne, superneque saltem in lineis duabus, pilis pallidis flaccidis multicellularibus obsiti; folia supra subaspera, hispida, subtus crebre glandulis rotundis obsita, fere glabra, marginibus prope basin nervoque medio pilis instructis; pedunculi phyllariaque glabra (*Hinton 12090* excepta); folia coriacea uninervia sessilia, summis exceptis lineari-elliptica vel oblanceolata, (1.5–) 2.5–5 cm longa, (1.5–) 3–7 mm lata, distaliter attenuata vel abrupte angustata, apicibus obtusis vel breve apiculatis; laminae versus bases dilatatas, paullo scariosas, vaginantes angustatae, multo infra medium paribus setarum 3–7, ad 3 mm longarum, munitae; capitula quoque ramo pauca vel ad 20, subsessilia in glomerulis terminalibus conferta; glomeruli foliis 4–6 lanceolatis fasciculum involucriforme formantibus suffulti superatique; capitula campanulata, radiis erectis vel patentibus inclusis 6–7 mm longa, omnino sessilia vel pedunculis subulato-bracteatis ad 2–4 mm longis suffulta; involucrum 4.5–5 mm longum, ad basin angustam truncatam attenuatum, distaliter ampliatum, tum sub apice constrictum; phyllaria subaequalia 5, elliptico-oblonga vel -obovata, late obtusa vel subacuta, tenuimarginata, 1.3–1.8 mm lata, maturitate basi aliquantum conduplicata, dorso obtuse 2–3-porcata, apicibus appressis vel subpatentibus; involucrum ut videtur 8–10-porcatum, phyllariorum carinis suberosis torulosis, centralibus basi non gibbis, versus apices productis, lateralibus solum in phyllariorum marginibus exterioribus prodientibus, phyllariis plusminusve connatis, capitula e receptaculo integra decidua; flores flavi, in siccitate non rubescentes, manifeste exserti, florum disci partes exsertae quam involucrum plus quam dimidio breviores; flores radii plerumque 5, ligulis 2–2.5 mm longis, 0.7–1.2 mm latis, ellipticis vel obovatis; styli ramuli laeves, 0.7–1 mm longi; flores disci 9–10, corollis tubuloso-campanulatis 3 mm longis, lobo solitario lineari-attenuato 1.5–1.8 mm separato, lobis 4 oppositis 0.5–0.7 mm longis; antherae ca 1.5 mm longae, basi auriculatae, appendicibus tenuibus brevibus, obtusis; styli glanduloso-hispidi, truncati, vix lobati; achaenia disci matura non visa, verisimiliter sterilia; achaenia radii 3 mm longa, nigrescentia, clavato-columnaria, striata, molliter pilosa; pappi squamellae inaequales ca 10, subulatae vel oblongae, hyalinae, 0.5–2 mm longae, apicibus capilliformibus; receptaculum subconvexum 0.5–0.6 mm latum.

MICHOACAN: Tepalcatepec, elev. 400 m, 24 Aug 1938, *Hinton 12090;* thorn forest on low hills between San Juan de los Plátanos and Amatlán, Mpio. de Buenavista, elev. 275 m, 17 Sep 1958, *McVaugh 17967* (MICH, type); 8 km SW of Nueva Italia, 15 Aug 1961, *Feddema 1722.*

In Nueva Galicia the only species with which this might be confused is *Pectis prostrata* Cav., in which the involucre is 5-keeled, the disk-flowers 4–5, the pappus-

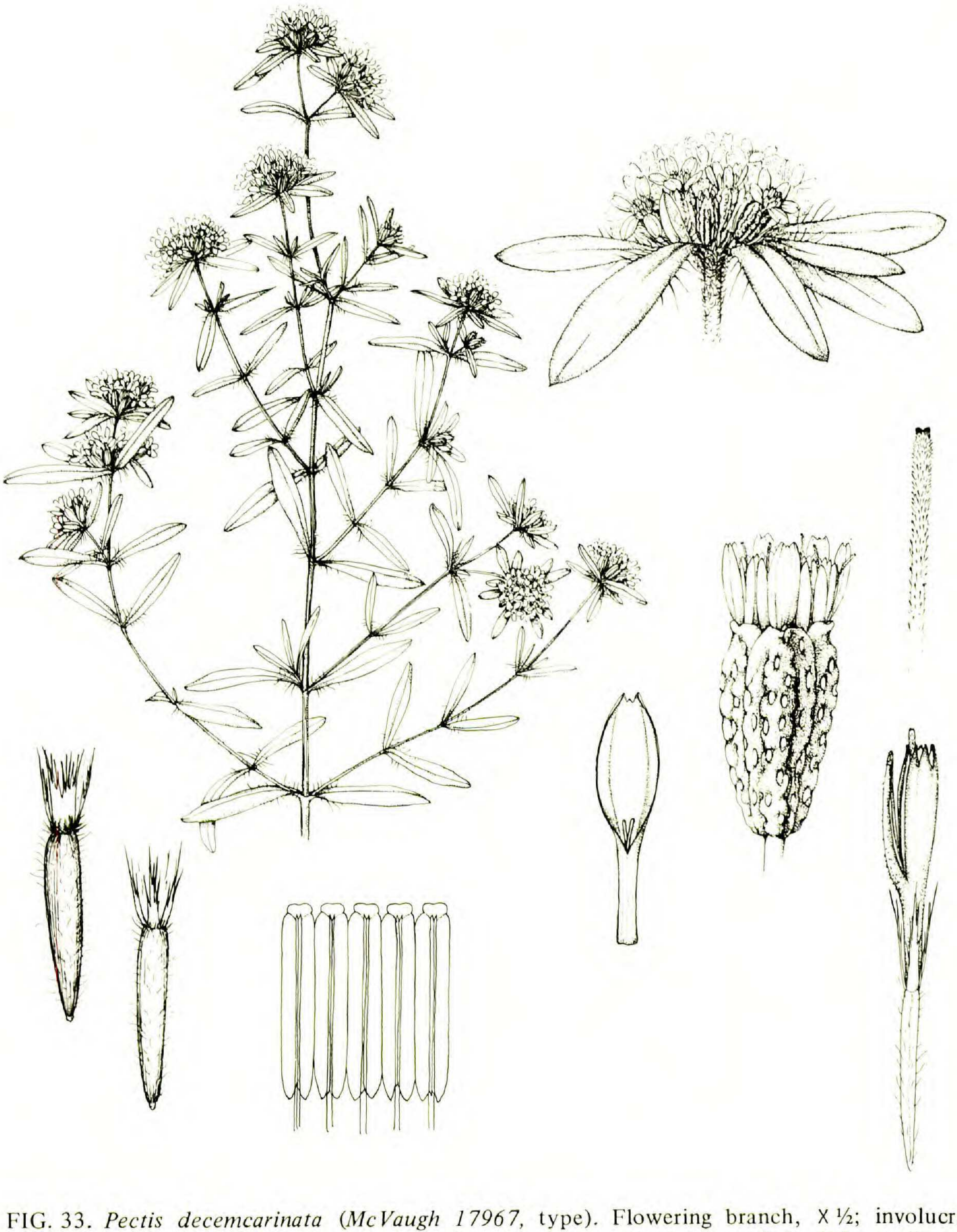

FIG. 33. *Pectis decemcarinata* (*McVaugh 17967,* type). Flowering branch, X ½; involucrate cluster of heads, ca X 1.5; flowering head, X 5; ray-corolla and achenes, X 7.5; disk-corolla with abortive achene, X 10; anthers and style, X 15.

scales usually 2 in the ray-flowers, 5 in the disk. In *P. decemcarinata* the sessile heads, in glomerules subtended by involucre-like clusters of leaves, are distinctive.

Pectis exserta McVaugh, sp. nov.

Annua, debilis, diffusa, 30 cm alta, ramis pedunculisque purpurascentibus, hispidulis; folia prope basin obscure ciliata, nervo medio subtus et marginibus asperis, cetera glabra; phyllaria glabra; folia subcoriacea, subtus glandulis rotundis 1–2-seriatis manifeste obsita, fere linearia, ad basin apicemque paullo angustata, 1.5–2.5 cm longa (ramorum breviora), 1–2.5 mm lata, obtusa apiculataque vel superiora acuta apiceque breviaristata, omnia uninervia, prope basin paribus 1–3 setarum debilium 1–2 mm longarum munita; rami repetite furcati, internodiis brevibus, capitulis plurimis, laxe subumbellatis, pedunculis erectis sed gracilibus subulato-bracteatis 1–2 cm longis; capitula radiis inclusis 8–9 mm longa; involucrum ca 4 mm longum, junius campanulatum, demum urceolatum, sub apice constrictum, basi 5-lobatum, truncatum; phyllaria subaequalia 5, elliptico-oblonga vel -obovata, late obtusa vel apice rotundata, pallide viridia, 1.3–1.8 mm lata, tenuimarginata, maturitate aliquantum conduplicata, obtuse carinata, apicibus tenuibus appressis, ciliatis, plerumque glandulosis; carina suberosa indurata, phyllarii tota longitudine apice excepto producta, basi gibba prolongata; flores aurei manifeste exserti, florum disci partes exsertae quam involucrum quarta parte breviores; flores radii plerumque 5, patentes, ligulis ellipticis, 3–4 mm longis, 1.3 mm latis, interdum in siccitate extus rubescentibus; styli ramuli laeves, 1 mm longi; flores disci 12–17, corollis 3–3.7 mm longis, anguste tubulosis, lobo solitario anguste lineari 1.5–2 mm separato, lobis 4 oppositis incurvatis, glanduloso-incrassatis, 0.25 mm longis; antherae 1.7 mm longae, subauriculatae, appendicibus tenuibus obtusis brevissimis; styli ramuli glanduloso-hispiduli, brevissime bifidi, apicibus oblongis obtusis 0.15 mm longis; achaenia nigrescentia, lineari-clavata, 2.5–2.8 mm longa, striata, pilosa; pappi squamellae ovato-triangulares vel lanceolatae 0.3–0.6 mm longae, erosae, acutae vel apicibus capilliformibus, disci florum inaequales ca 5, radii deminutae ex pari aristarum dorso-lateralium constantes, vel aristam tertiam minorem abaxialem includentes; receptaculum convexum, 0.5 mm latum, breve glanduloso-pubescens, phyllariorum cicatricibus profundis lateralibus.

JALISCO: Tropical subdeciduous forest 8 km WSW of Cihuatlán, with *Orbignya*, elev. ca 100 m, 7 Nov 1960, *McVaugh 20807* (MICH, type). Otherwise unknown.

In the account of *Pectis* in the *North American Flora* (vol. 34, p. 195. 1916) this would seem to be identified with *P. propetes* Greenm., a little known species of northern Jalisco. In *P. exserta,* however, the involucre is 6–7 mm long, campanulate, not constricted distally, the phyllaries are moderately keeled near the base (only), and the pappus is 0.8–1.5 or 2 mm long.

Perityle feddemae McVaugh, sp. nov.

Suffrutex caulibus florentibus plurimis basi excepta herbaceis ramosis 10–25 cm altis, e caudice lignoso 1 cm crasso corticato oriundis, inferne subglabris; rami superiores, pedunculi, folia involucraque sparsiuscule pilis brevibus, pallidis appressis vel crispatis pubescentia; partes vegetativae (praecipue folia) crebre globulis resinosis impressis obsitae; folia principalia (et inferiora) opposita (ramorum superiorum plerumque alterna), petiolo 7–12 mm longo incluso 2–3.5 cm longa; laminae in ambitu late ovatae, subternatim semel aut bis in segmentis oblongis vel cuneato-oblanceolatis obtusis dissectae, segmentis 1–8 mm longis, 0.5–2 mm latis, rhachide 0.3–0.8 mm lata; capitula ca 5–6 mm alta, compressa 5–7 mm lata, ad apicem caulis et in axillis summis solitaria, pedunculis 5–17 mm longis; involucrum hemisphaericum vel late campanulatum, obscure biseriatum; phyllaria 15–18, subaequalia, 4–5 mm longa, 0.8–1.3 mm lata, elliptico-oblanceolata, acuta, apicibus tenuibus, basi gibba obtuseque carinata; flores radii nulli; flores disci 30–40, corollis flavidulis 2.5 mm longis, stipitato-glandularibus, tubo quam fauce anguste campanulata breviora, lobis 4 triangularibus

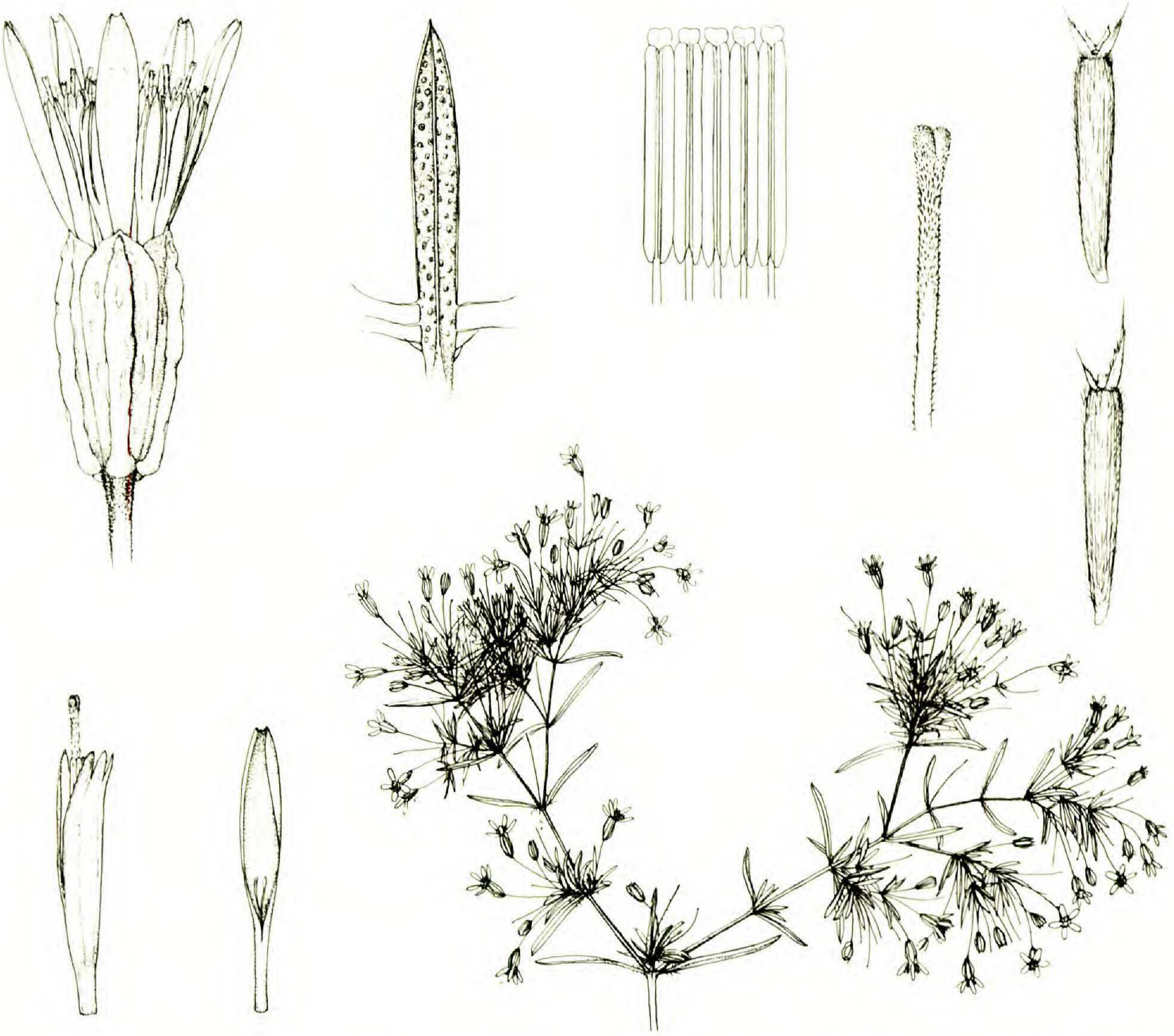

FIG. 34. *Pectis exserta* (*McVaugh 20807*, type). Flowering branch, X ½; flowering head, X 6.5; cauline leaf, X 5; ray-corolla, X 6; disk-corolla, X 7.5; achenes, X 10; anthers, X 15; style-tips, X 20.

0.5 mm longis, apicibus extus resinoso-globuliferis; antherae 4 subauriculatae, appendicibus ovatis obtusis inclusis 1.3 mm longae; styli ramuli applanati 1 mm longi, apicibus recurvatis obtusis vel acutis, papillosis; achaenia nigrescentia, compressa, ambitu oblanceolato-oblonga, 2.2–2.9 mm longa, ca 0.5–0.8 mm lata, marginibus crassis albis callosis appresse strigosa, faciebus pilis bifurcatis paucis instructis; pappus ex aristis subaequalibus 2, rigide erectis, marginalibus 0.7–1.2 mm longis, coronaque lacerata 0.2 mm longa constans; receptaculum convexum 1.7–2 mm latum, vetustate lucens, phyllariis valde reflexis circumcinctum, cicatricibus achaeniorum paullo impressis.

Species in honorem dixi discipuli nunc collegae Charles Feddema (1920–   ), qui Compositarum generis *Sclerocarpi* revisionem egregiam elaboravit.

JALISCO: Rancho Viejo, ca 10 km ENE of Huejuquilla el Alto, rock-crevices, open oak-woodland, elev. 1900 m, 31 Oct 1963, *Feddema 2278* (MICH, type).

Of the known rock- or cliff-dwelling species of *Perityle*, this appears to be the only one with dissected leaves and discoid heads.

Perymenium alticola McVaugh, sp. nov.

Herba grandis basi lignosa, vel frutex inflorescentia excepta subsimplex, caulibus 2–3-metralibus, basi ad 1.5–2 cm crassis; partes vegetativae per pilos breves, rigidos appressos asperatae, pilis longioribus ad 0.6 mm longis; folia triplinervia, lanceolato-

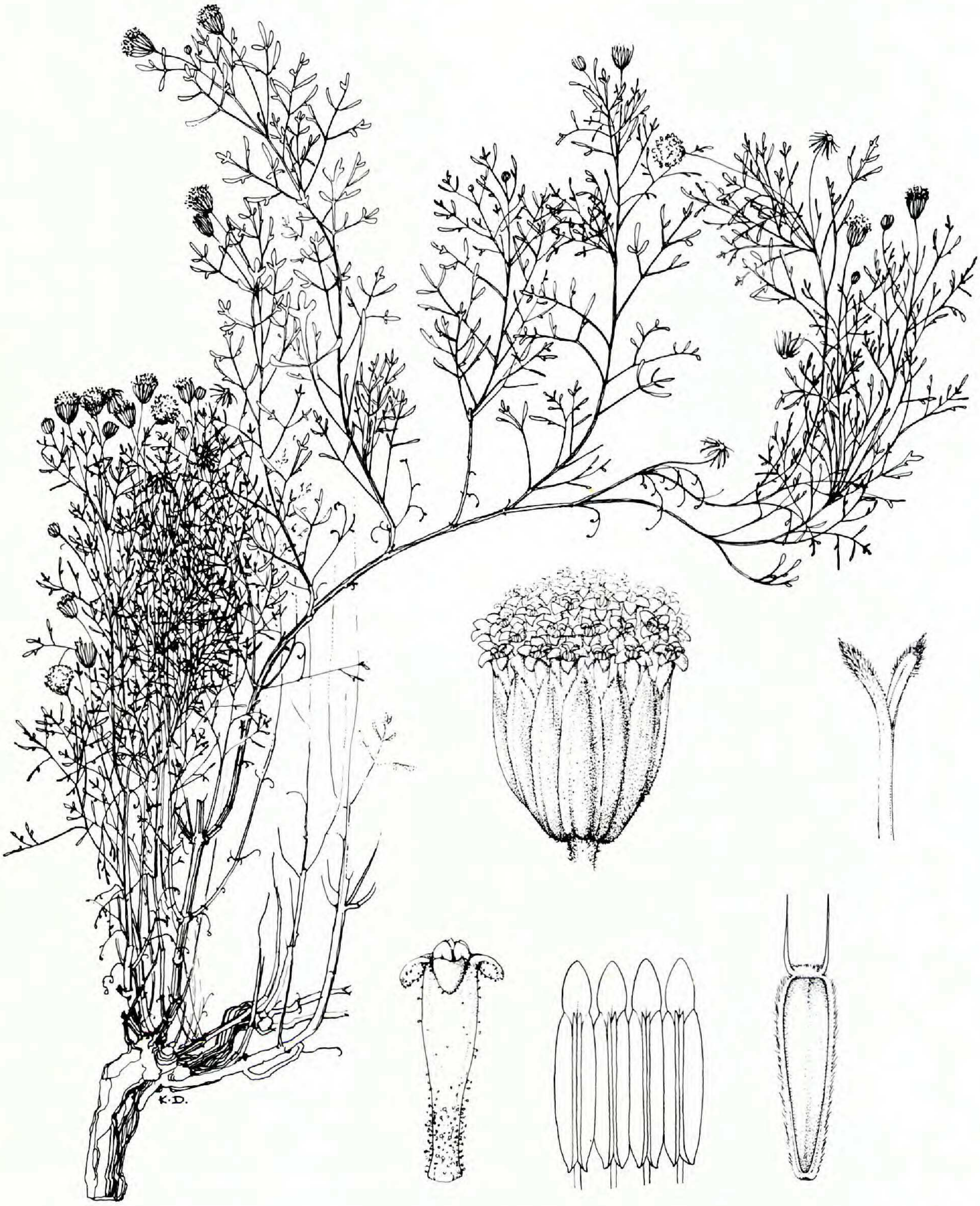

FIG. 35. *Perityle feddemae* (*Feddema 2278,* type). Flowering and fruiting plant, ca X 3/5; flowering head, X 6; achene, X 9; disk-corolla and style-branches, X 12; anthers X 20.

ovata, 6–14 cm longa (ramorum minorum florentium 3–5 cm longa), (1–) 2–4.5 cm lata, 2.5–4-plo longiora quam latiora, apice sensim longe acuminata vel attenuata, basi rotundata, petiolis 3–7 (vel 8–23) mm longis, marginibus dentibus utroque latere 7–15 non profunde remotiusculeque denticulatis; capitula pauca, terminalia axillariaque ad ramorum apices in fasciculis corymbiformibus, pedunculis plerumque ternis vel quinis 1.5–6 cm longis, e nodo folioso terminali oriundis, interdum pedunculorum axillarium vel ramorum brevium foliosorum alia insuper pari vel paribus e nodis proximis; capitula 2.5–3.5 cm lata (radiis extensis mensa), sub anthesi 12–15 mm alta; involucrum campanulatum, 8–10 mm altum, basi rotundatum, ca 2–3 seriatum; phyllaria ca 13, exteriora breviora ca 5 (interdum bracteis pedunculi 1–2 arcte

suffulta), ovata, 4–6.5 mm longa, 2.5–5 mm lata, herbacea vel purpurascentia, apicibus crassis obtusis vel acutis; phyllaria interiora (radios subtendentia) subaequilonga, 8–10 mm longa, 2–3.5 mm lata, ovata vel elliptica vel obovata, vel intima late linearia, apicibus tenuioribus (interdum membranaceis), subacutis vel obtusis, erosis; flores radii ca 8, ligulis aureis 1–1.5 cm longis, 3.5–4.5 mm latis, oblongis, tubo 2.5 mm longo; styli ramuli 1.5 mm longi; flores disci ca 20–30, corollis aureis 6.5–9 mm longis, tubo 2–3.5 mm longo, fauce anguste campanulata, lobis anguste triangularibus acutis hispidis 1–2 mm longis; antherae 2.3–3.2 mm longae, atrobrunneae, appendicibus pallidis acutis 0.7–1 mm longis; styli ramuli lineares 1.3–2 mm longi, intus applanati, apicibus acutis extus pilosis; achaenia disci biconvexa 3.5–4.5 mm longa, 1.3–1.7 mm lata, versus apicem in collum breve pappum ferens rotundata; pappi aristae setiformes 25–30, duabus marginalibus exceptis 1–2 (–3) mm longae (interior 3–4.5 mm longa, exterior paullo brevior); achaenia radii similia sed plano-convexa vel trigona, pappo ut in achaeniis disci, una arista (adaxiali) longiore, vel ad angulos aristis 3 quam ceteris longioribus; paleae 8–12 mm longae, conduplicatae carinataeque, membranaceae, apicibus acutis, flavidis vel nigrescentibus, saepe corrugatis.

JALISCO: 25–30 km SE of Autlán, steep rocky summits in mountains between El Chante and Cuzalapa, in pine forest, elev. 2000–2250 m, 19–22 Mar 1965, *McVaugh 23173* (MICH, type); Nevado de Colima, southeastern slopes, in fir forest, elev. 2850 m, 2 Apr 1951, *McVaugh 11712, 11712A*. Otherwise unknown.

In the collections from the Nevado de Colima the heads are fewer, and darker in drying, with longer pales, longer flowers, and more rigid, herbaceous and pubescent phyllaries, than in the type. The significance of these differences is unknown. It is possible that two species are included here under the one name.

This is one of the few species of *Perymenium* having large heads and relatively long petioles. It appears to be distinct from all other Mexican species, but I cannot suggest what its affinities within the genus may be.

Perymenium buphthalmoides DC. in DC. Prodr. 5: 609. 1836.

The highly variable complex that includes *Perymenium buphthalmoides* was treated by Robinson and Greenman, and later by Blake, as a group of 4 or 5 species distinguished by leaf-shape, by the shape of the phyllaries and by differences in pubescence. Blake described *P. simulans* as having a "well developed pappus," and Greenman similarly characterized *P. flexuosum* as having a "reduced" pappus. None of these characters seems to be satisfactory as a criterion of taxonomic difference. Many individual specimens are intermediate in one respect or another, and the different populations are not very satisfactorily separated, but in Nueva Galicia their ranges seem not to overlap to any great extent. Var. *tenellum* is a plant primarily of grasslands and their margins from Durango to San Luis Potosí; var. *buphthalmoides* occurs in the relatively dry, open montane forests, especially in the Sierra Volcánica Transversal; var. *flexuosum* is apparently restricted to the higher mountains between the region of Mexico City and Cerro Tancítaro; and var. *occidentale* is a plant of relatively humid forests of the mountains and valleys of the Pacific slope in Nueva Galicia.

1. Paleae 5.5–7 mm longae, flexibiles, apicibus angustis attenuatis 1.5–3.5 mm longis; pubescentia relative tenuis, appressa, pilis phyllariorum venorumque foliarium majoribus 0.5 mm longis vel brevioribus; achaenia 3–3.5 mm longa. var. *occidentale*.

1. Paleae 3.5–5 mm longae, apicibus rigidis, breviacutis, plerumque purpurascentibus, vel cum paleis 6.5–8 mm longis; plantae grosse pilosae, pilis plusminusve patentibus ad 1 mm longis vel longioribus.

  2. Paleae 3.5–5 mm longae, rigidae, plerumque purpurascentes, apicibus triangularibus vel deltoideo-acuminatis 0.5–2 mm longis; in montibus Sierra Volcánica Transversal dictis, et in montibus propinquis.

    3. Folia caulinia manifeste ovata, saepe petiolis 3–6 mm longis suffulta, dentibus 0.5–1.5 mm altis serrata vel crenato-serrata; paleae purpurascentes; achaenia 2–2.5 mm longa; pedunculus, et plerumque involucri basis, pilis ascendentibus vel

patentibus copiose obsita; ab urbe Mexico ad civ. Michoacán partem occ. distributa, 2500–3000 m.s.m. var. *flexuosum.*

3. Folia caulinia elliptica, lanceolata vel ovato-lanceolata, subsessilia (raro ovata petiolataque), denticulata vel serrata, dentibus saepe brevibus remotiusculisque; paleae flavidae vel purpurascentes; achaenia 2.5–3 mm longa; pedunculus involucrumque appresse saepeque sparsiuscule pilosum; a Nayarit ad Oaxacam, elev. 2000–2500 m.s.m. var. *buphthalmoides.*

2. Paleae 6.5–8.5 mm longae, rigidae vel paullo flexuosae, flavidae vel purpurascentes, apicibus angustis attenuatis 2–3 mm longis; pubescentia pro maxima parte grossa, pilis caulium venarumque foliarium majoribus ad 1 mm longis vel longioribus, plusminusve patentibus; a Durango ad San Luis Potosí. var. *tenellum.*

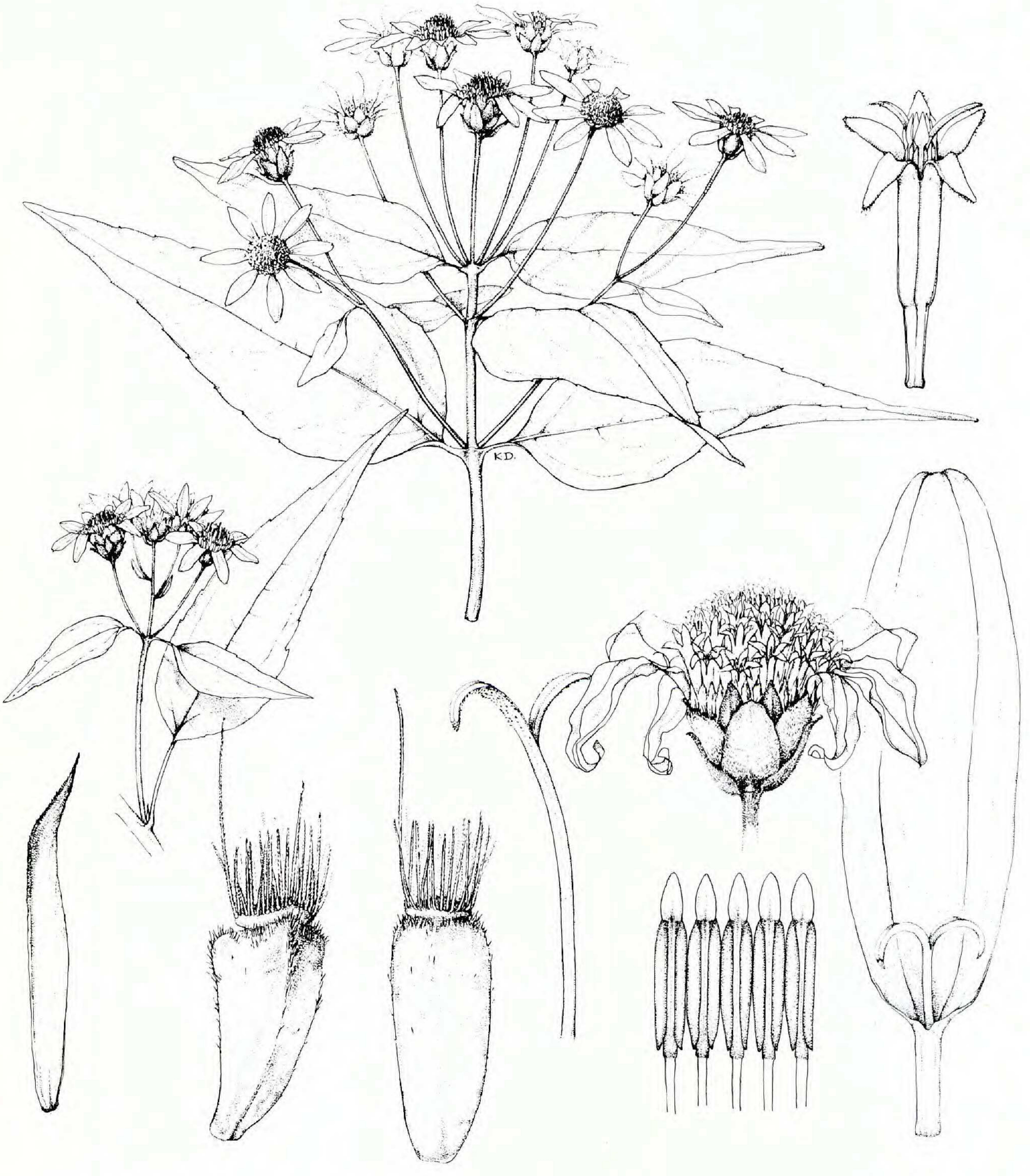

FIG. 36. *Perymenium alticola.* Flowering branch at left (*McVaugh 23173,* type), X ½. Flowering branch above, X ½; and floral details, from *McVaugh 11712:* Head in late anthesis, X 1.5; pale, X 3.5; disk-corolla, X 4; ray-corolla, anthers, style-tips, X 5; ray-achene (left) and disk-achene, X 7.5.

Perymenium buphthalmoides DC., var. **flexuosum** (Greenm.) McVaugh, comb. nov. *Perymenium flexuosum* Greenm. Proc. Am. Acad. 41: 263. 1905.

Perymenium buphthalmoides DC., var. **tenellum** (A. Gray) McVaugh, comb. nov. *Perymenium tenellum* A. Gray, Proc. Am. Acad. 15: 36. 1879. *Perymenium simulans* Blake, Contr. U.S. Nat. Herb. 22: 621. 1924.

Perymenium buphthalmoides DC., var. **occidentale** McVaugh, var. nov.

Specimens of var. *occidentale* examined:

NAYARIT: Open oak woodland, mountains 16 km SE of Ahuacatlán, elev. 1100–1300 m, 7 Jul 1957, *McVaugh 15147.*

JALISCO: Forested mountainsides above La Resolana, highway to Autlán, 300 m elev., 6 Jul 1949, *Wilbur & Wilbur 1548;* 1050 m elev., 9 Jul 1949, *Wilbur & Wilbur 1606;* near Guadalajara [Río Blanco], 7 Aug 1902, *Pringle 8624* (US); LaPalma, 9 Jun 1892, *M.E. Jones 283* (US); Tecalitlán, Sierra del Halo, in pine forest, elev. 2000 m, 15 Aug 1957, *McVaugh 16218;* Tecalitlán, Puente San Pedro, in oak-pine forest, 1200 m, 16 Jul 1957, *McVaugh 15439* (MICH, type).

MICHOACAN: Coalcomán, Sierra Torrecillas, elev. 2350 m, 25 Jul 1939, *Hinton 13997* (US).

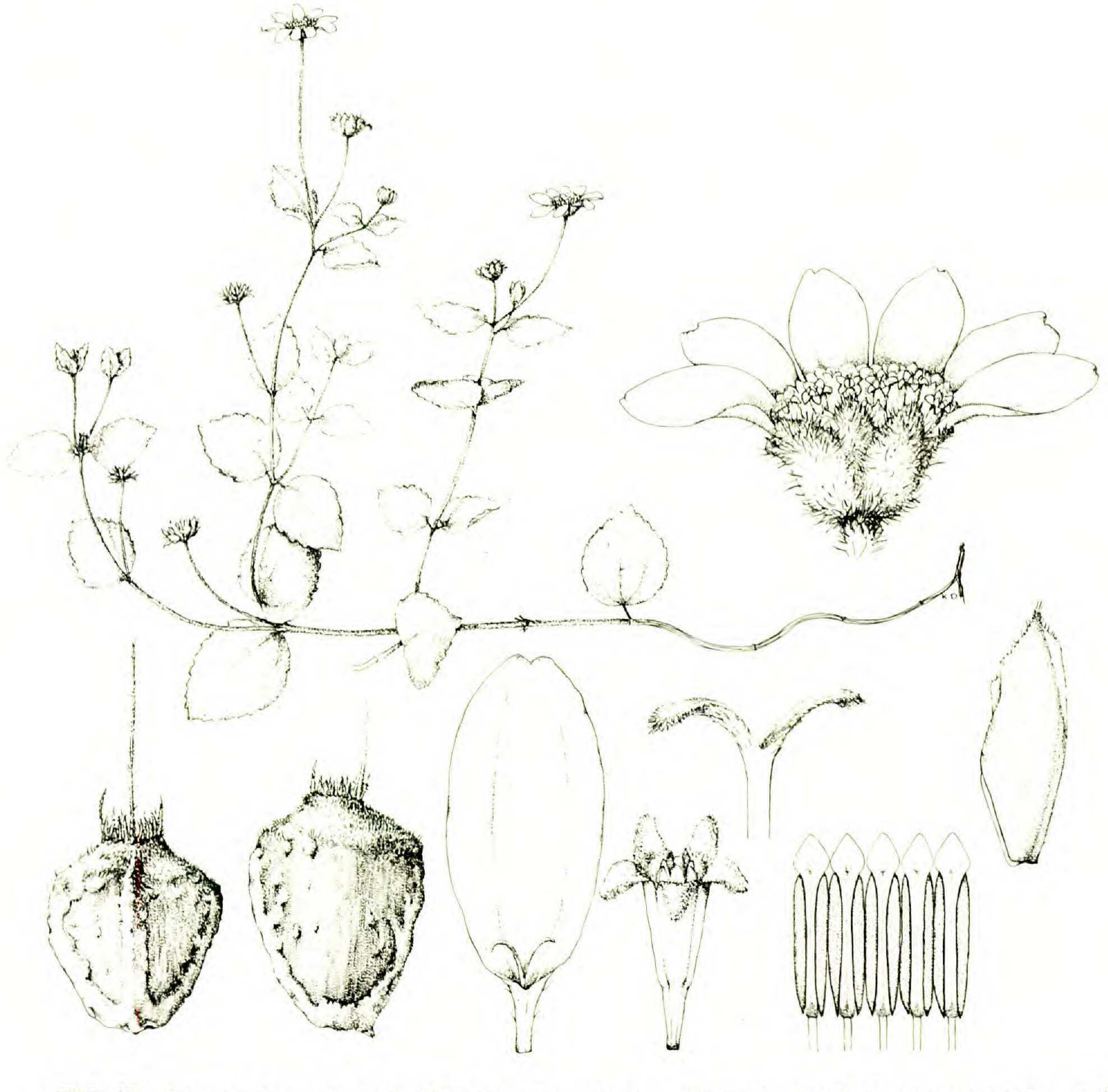

FIG. 37. *Perymenium diguetii* (*Diguet s.n.*, type). Flowering and fruiting branch, X ½; flowering head with two rays removed, X 2.5; ray-corolla, X 5; disk-corolla, and pale, X 7.5; ray-achene (left), disk-achene, and anthers, X 10; style-branches, X 15.

Perymenium diguetii McVaugh, sp. nov.

Herba decumbens vel subascendens, caulibus paucis ramosis 20–40 cm longis, 1–2 mm crassis, e caudice lignoso oriundis; partes vegetativae rigide pilis patentibus vel ascendentibus 0.5–1.5 mm longis obsitae; caules hirsutuli; folii involucrique pilis crassis ascendentibus; folia ovata, 1–2.8 cm longa, 0.5–2.2 cm lata, 1–1.5-plo longiora quam latiora, apice obtusa vel subacuta, basi rotundata vel subcordata, petiolis 1–2 mm longis, marginibus utroque latere dentibus 6–12 grosse crenato-serratis; caules 4–7-nodi, in capitulo pedunculato terminantes, pedunculo terminali 2–7.5 cm longo, plerumque ramis foliosis ex eodem nodo axillaribus superato, ramis capitulo solitario terminali vel 1–3-plo furcatis et capitula pedunculata pauca producentibus; capitula 1.5–2.5 cm lata (radiis extensis mensa); involucrum hemisphericum vel latius; phyllaria subaequalia, quam radii vix plura et eos plerumque subtendentia, 3.7–5.5 mm longa, 1.5–2.7 mm lata, oblongo-elliptica vel ovata, apicibus crassis herbaceis, acutis vel rotundatis, basi pallidiora, rigida; flores radii 7–11, ligulis aureis, oblongo-obovatis, ca 6–8 mm longis, 3–4 mm latis; styli ramuli ca 1 mm longi; flores disci 25–40, corollis 3.7 mm longis, tubo angusto 1–1.5 mm longo, fauce lutea subcylindrica vel campanulata, et lobis aureis triangularibus breve hispidis 0.7 mm longis; antherae 1.5 mm longae, nigrescentes connectivis pallidis, basi auriculatae, appendicibus rigidis cochleariformibus 0.5 mm longis; styli ramuli prope apices dilatati, applanati, penicillati; achaenia disci 2.2–2.5 mm longa, 1.3–1.8 mm lata; achaenia radii 2.2 mm longa, latere abaxiali 2 mm lata; pappus ex arista adaxiali setiformi rigida 1.8–2.2 mm longa, antrorse barbellata, caduca, aristisque gracilioribus 2–10 deciduis 0.2–0.5 mm longis constans; paleae 3–4 mm longae, rigidae, saepe purpurascentes, apice abrupte acuto vel late triangulari 1–1.5 mm longo.

Species alteram Léon Diguet (1859–1926), in honorem dicavi.

NAYARIT: Sierra del Nayarit, partie occidentale, *Diguet* (MICH, type; P); in the Sierra Madre near Santa Teresa, 8 Aug 1897, *Rose 3313* (US); between Santa Gertrudis and Santa Teresa, 8 Aug 1897, *Rose 2077* (US).

This species is evidently closely related to *Perymenium buphthalmoides* DC., but in that species the ligules are often 1–2 cm long, the phyllaries are usually more than 5 mm long, the leaves are usually twice as long as wide, or longer, and with acute teeth, and the stems are simple, or with terminal and axillary peduncles from the terminal node, seldom with leafy branches that greatly surpass the central peduncle.

Perymenium hintonii McVaugh, sp. nov.

Frutex procerus vel arborescens 3–4-metralis, copiose ramosus; partes vegetativae strigosae, asperulae, pilis pro maxima parte brevissimis, appressis, pilis longioribus ad nodis et in foliis (praecipue subtus in venis) ad 0.8–1.3 mm longis; phyllaria strigosa et conspicue ciliata; folia ovata, 3-nervata, 5–7 cm longa (vel ramorum minorum florentium 2.5–4.5 cm longa), (1–) 2–4 cm lata, apice acuta vel acuminata, basi rotundata, petiolis 3–8 mm longis, marginibus non profunde serratis vel denticulatis; inflorescentia bene evoluta subcorymbosa, ramis divaricatis 10–25 cm longis, ascendentibus, ramulis ultimis interdum alternis parvibracteatis, capitulis subirregulariter dispositis, solitariis vel binis vel ternis, pedunculis 1–4 cm longis; capitula ca 2.5–3 cm lata (radiis extensis mensa), sub anthesi 9–12 mm alta; involucrum campanulatum (statu fructifero hemisphericum), 7–9 mm altum, basi late rotundata 4–6 mm crassum, 2–3-seriatum; phyllaria ca 13–16, exteriora gradatim breviora, 5–7, sterilia, ciliata, ovata, suborbicularia vel late elliptica, 3–7 mm longa, 2.5–5 mm lata, apicibus crassis sed vix herbaceis, obtusis vel rotundatis; phyllaria interiora (achaenia subtendentia) 6–9 mm longa, late elliptica vel obovata, late obtusa vel acuta, 4–5 mm lata (vel intima angustiora, in paleas transientia), apicibus membranaceis pallide viridibus flavidulisve, subpetaloideis, fimbriatis, ciliis 0.4–0.8 mm longis; flores radii ca 7–9, ligulis aureis 1 cm longis, 3 mm latis, tubo 1.5–2.5 mm longo; styli ramuli 1.5 mm longi; flores disci ca 16–20, corollis aureis 7–8.8 mm longis, tubo 1.5–2 mm longo, fauce cylindro-campanulata, lobis acutis anguste triangularibus 1–1.4 mm longis; antherae brunneae 2–2.5 mm longae, appendicibus anguste ovatis acutis 0.8–1 mm longis; styli ramuli 1.7–2.3 mm longi, apicibus pilosis, longe attenuatis, subulatis; achaenia disci biconvexa, 3.3–4.7 mm longa, apice truncato 1.6–2 mm lata, in angulis duobus interdum dente erecto piloso 0.8–1 mm longo munita; pappus ex aristis setiformibus 20–30 in corona breve centrali dispositis constans, aristis minoribus 0.7–2 mm longis vel 1–2 longioribus, interiore (adaxiali) quam ceteris crassiore longioreque, 2.6–4.5 mm longa; achaenia radii similia, trigona, interdum in angulis brevidentata; pappi aristi 1 vel 3 longiores, ceteris brevioribus; paleae membranaceae, carinatae, 5–7 mm longae, apicibus inflexis subacutis flavidulis.

Species George Boole Hinton (1883–1943), plantarum mexicanarum collectori indefesso, nominavi.

MICHOACAN: Mpio. Apatzingán, Acahuato, elev. 740 m, 17 Aug 1938, *Hinton 12045* (MICH, type); above Acahuato, pine forest, elev. 960 m, 17 Aug 1941, *Leavenworth & Hoogstraal 1660.*

MEXICO: Temascaltepec, Naranjo, 8 Oct 1935, *Hinton 8534.* Otherwise unknown.

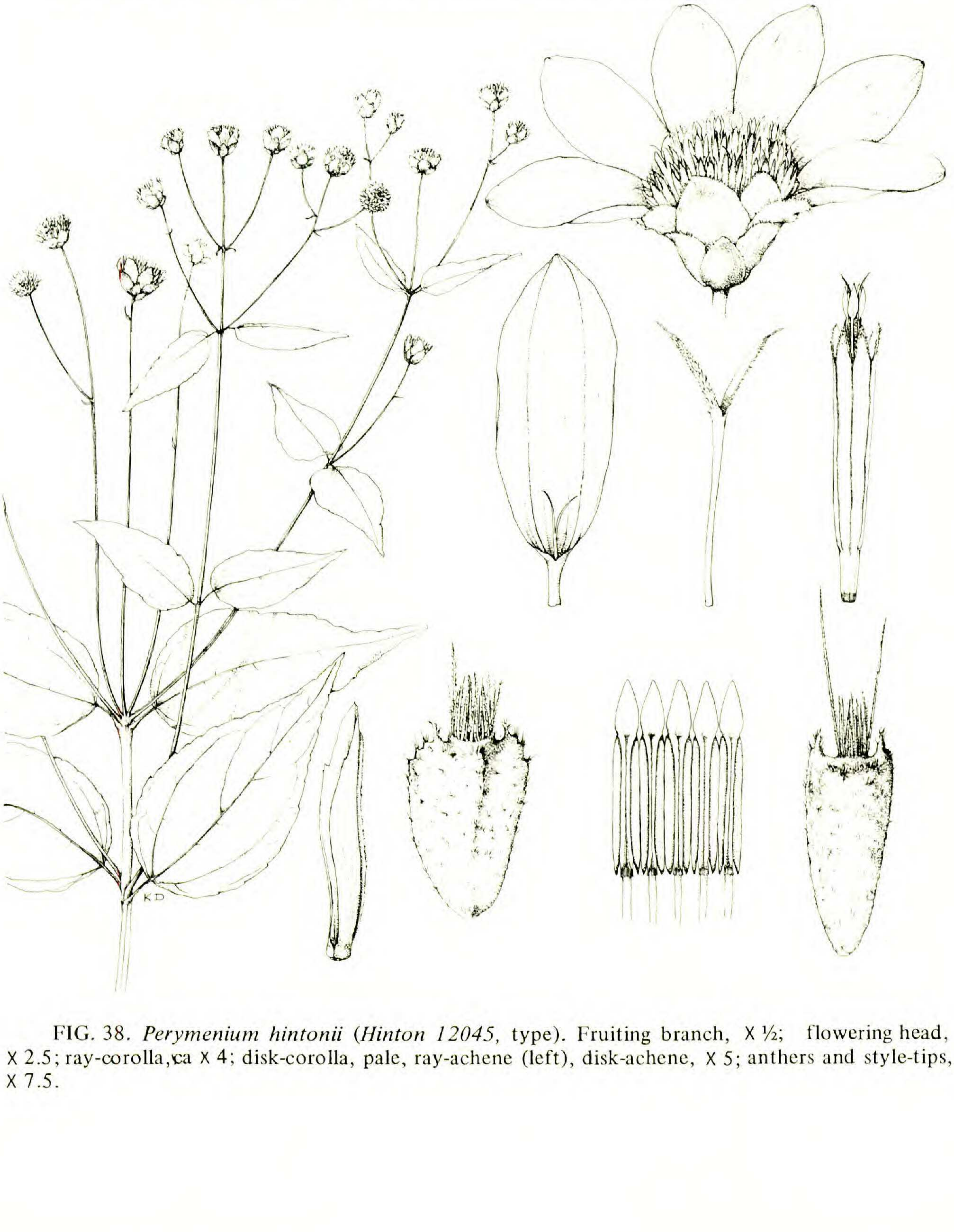

FIG. 38. *Perymenium hintonii* (*Hinton 12045,* type). Fruiting branch, × ½; flowering head, × 2.5; ray-corolla,ca × 4; disk-corolla, pale, ray-achene (left), disk-achene, × 5; anthers and style-tips, × 7.5.

Superficially this species somewhat suggests *Perymenium pringlei* Rob. & Greenm., but the heads, flowers, and achenes are larger than in that species, the petioles are shorter, and the leaves in *P. hintonii* are somewhat bullate beneath. From *P. verbesinoides* DC. the new species differs in having the phyllaries mostly obtuse and the inner phyllaries with broad ciliate tips, the leaves flat (not rugulose), the disk flowers 16–20 (not 25–35).

Perymenium jaliscense Rob. & Greenm., var. **latifolium** McVaugh, var. nov.

A var. *jaliscensi* foliis latioribus ovatis 2.2–2.4 cm latis, petiolis 4–8 mm longis, ligulis radii 10–14 mm longis differt.

NAYARIT: Cerro Sangangüey, ca 17–18 km SE of Tepic, open oak woodlands, elev. 1600–1800 m, 24 Aug 1959, *Feddema 927, p.p., 937.*

JALISCO: Mpio. de Tecalitlán, Sierra de los Corales, pine-oak forest, elev. 1600 m, 24 Oct 1963, *Rzedowski 17415* (MICH, type).

The var. *jaliscense* is little known except from the original collections by Palmer (1886) and Pringle (1903). It seems strange that it has not been found again near the type-locality, somewhere in the vicinity of Guadalajara. The leaves are elliptic to lance-ovate, 0.8–1.7 cm wide, the petioles 1.5–4 mm long, and the ligules probably 6–8 mm long.

Perymenium uxoris McVaugh, sp. nov.

Frutex erectus multiramosus ligno duro, ramis foliisque omnino oppositis; rami angulis 4 obtusis sulcisque interjacentibus, pilis brevissimis pallidis appressis strigosi, ramuli hornotini pedunculique interdum pilis dealbati; folia utrinque asperata, subtus in venis pilis rigidis papillosis attenuatis instructa; phyllaria pilis 0.2–0.4 mm longis fimbriato-ciliata, cetero subglabra vel pilis paucis prope apices; folia siccata rigida, lanceolata vel ovato-lanceolata, 5–10 cm longa, 0.8–3.5 cm lata, 3–5-plo longiora quam latiora, apice acuta, basi rotundata vel acuta, petiolis 5–12 mm longis; laminae penniveniae, venis utroque latere 4–6 valde arcuato-ascendentibus, marginibus paullo incrassatis revolutisque, utroque latere dentibus 6–15 denticulatis vel crenatis; inflorescentiae corymbosae, ramorum majorum foliosorum 15–25 cm latae, ramulis secondariis in paribus 3–6 dispositis, ascendentibus, 10–25 cm longis, capitulis plurimis, ad ramorum apicibus in cymis parvis confertis, sessilibus vel pedunculis 1–2 mm longis suffultis, plerumque per folia superiora superatis; bracteae cymarum 5–8 mm longae; capitula florentia anguste turbinata, 8–11 mm alta, 2.5–3.5 mm lata (1–1.5 cm lata radiis extensis mensa); involucrum 5–7.5 mm altum, biseriatum; phyllaria ca 10, subaequalia vel exteriora omnia vel ex parte paullo breviora angustioraque, omnia elliptico-oblonga vel -oblanceolata, basi coriacea, apicibus obtusis, membranaceis vel papyraceis (extima interdum apicibus brevibus viridibus); phyllaria interiora (radios subtendentia) 1.3–2 mm lata, ad basin plerumque angustata, apicibus membranaceis 2–3 mm longis; flores radii vulgo 5, ligulis aureis, erectis vel subpatentibus, ellipticis, 5 mm longis, 1.5 mm latis, tubo gracillimo 2.5–3 mm longo; styli ramuli 1.5 mm longi; flores disci 8–10, corollis aureis 4–5 mm longis, tubo cylindrico 1.5–1.7 mm longo, in faucem campanulatam abruptiuscule ampliato, lobis triangularibus hispidulis 0.6–0.8 mm longis; antherae flavo-brunneae 2 mm longae, basi auriculatae, appendicibus ovatis coriaceis 0.5 mm longis; styli ramuli 1.7 mm longi; achaenia nigrescentia 3–3.5 mm longa, compressa, ambitu elliptica vel elliptico-obovata (disci biconvexa crassa, radii plerumque angulo interiore instructa), distaliter marginibusque strigosa, supra medium marginibus subalatis, laciniatis, alis in aristas planas ad 1 mm longas et basi 0.7 mm latas productis; aristae pappi ca 30, 0.5–2 mm longae; paleae membranaceae 4–5 mm longae, 1.5 mm latae, conduplicatae, carina angusta minute ciliata, apicibus brevibus acutis, erosis.

Species uxori carissimae Ruth Lillian Beall, quae mecum in peregrinationibus multis per terram mexicanam libenter perlustravit, grate nominavi.

TYPE: NAYARIT: On deep eroding sandy soils in oak-savannah region 6–8 km E of Las Varas, on the new road to Compostela, elev. 200 m., 20 Dec 1970, *McVaugh 25583* (MICH). Known only from the type-locality.

Among the shrubby species of *Perymenium* in Nueva Galicia, this one and *P. wilburorum* are unique in having green and moderately long-petioled leaves, heads numerous in leafy inflorescences, and the phyllaries all narrow and elongate, subequal, the involucre not graduate. I have not located any previously published names pertaining to these taxa, but it is possible that they represent isolated populations of species already known from eastern Mexico or Central America.

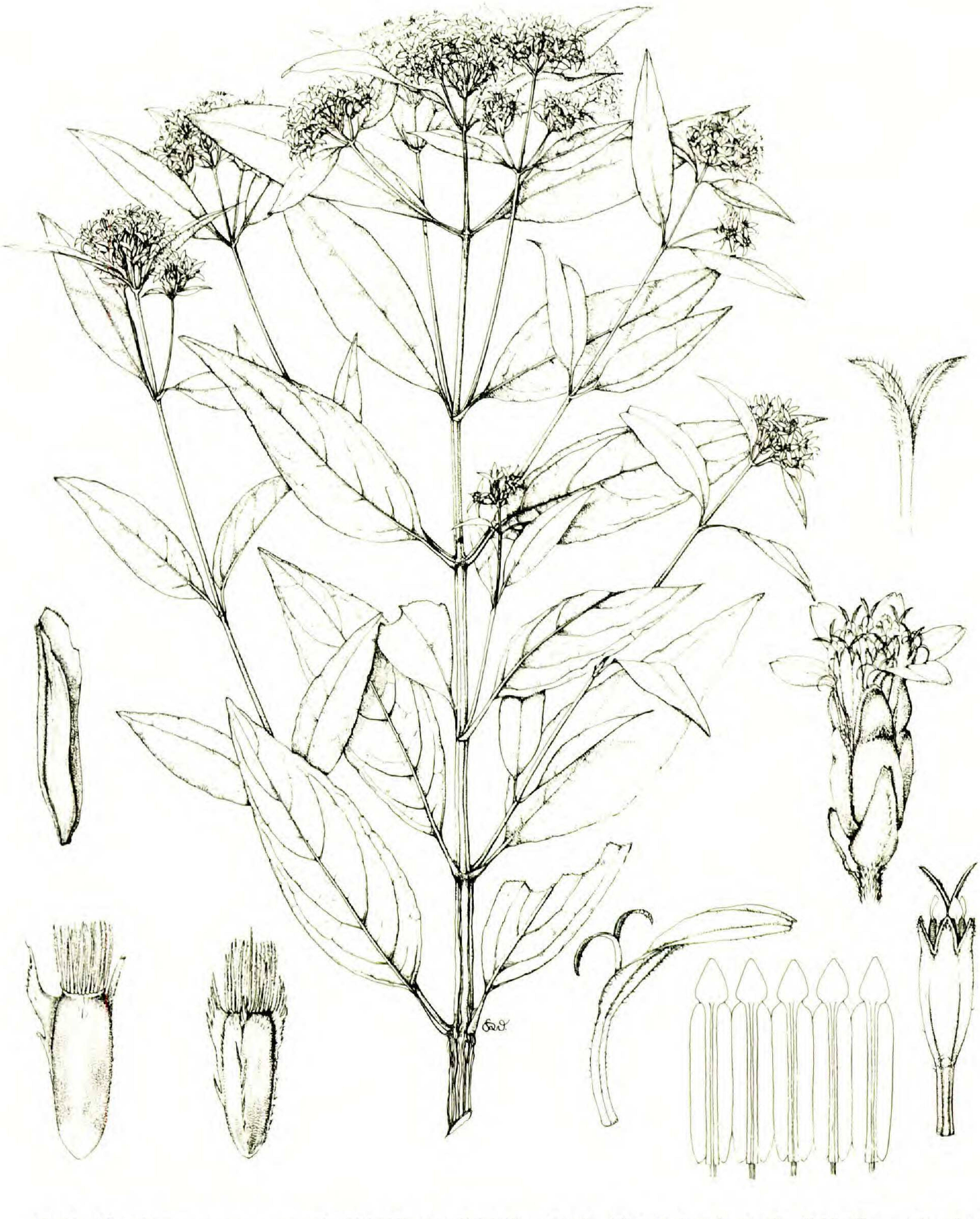

FIG. 39. *Perymenium uxoris* (*McVaugh 25583*, type). Flowering branch, X ½; flowering head, X 2.5; corollas, disk-achene (left), ray-achene, pale, X 5; anthers and style, X 10.

Perymenium wilburorum McVaugh, sp. nov.

Frutex gracilis copiose ramosus 1.5–3-metralis, pilis rigidis appressis vel ascendentibus omnino asperatus; folia supra pilis attenuatis basi crassis scabra, subtus resinoso-globulifera pilisque mollioribus gracilioribusque crebre obsita vel fere tecta, venis pilosis, pilis rigidioribus; folia triplinervia, lanceolato-ovata, 4–9 cm longa, 1–3 cm lata, 2.5–3.5-plo longiora quam latiora, sensim longe acuminata, basi rotundata vel subcordata, marginibus revolutis, manifeste vel obscure denticulatis, basi in petiolos 5–10 mm longos cuneatim decurrentibus; capitula 3–4 cm lata (radiis extensis mensa), sub anthesi 10–13 mm alta, ad ramorum apicibus terminalia axillariaque, saepe ad nodis terminalibus terna, vel e nodo subterminali pedunculorum axillarium vel ramorum brevium foliosorum florentium pari oriundo; involucrum late campanulatum, apice pedunculi valde impressum; phyllaria 9–12, lanceolata, herbacea, vel basi gibba

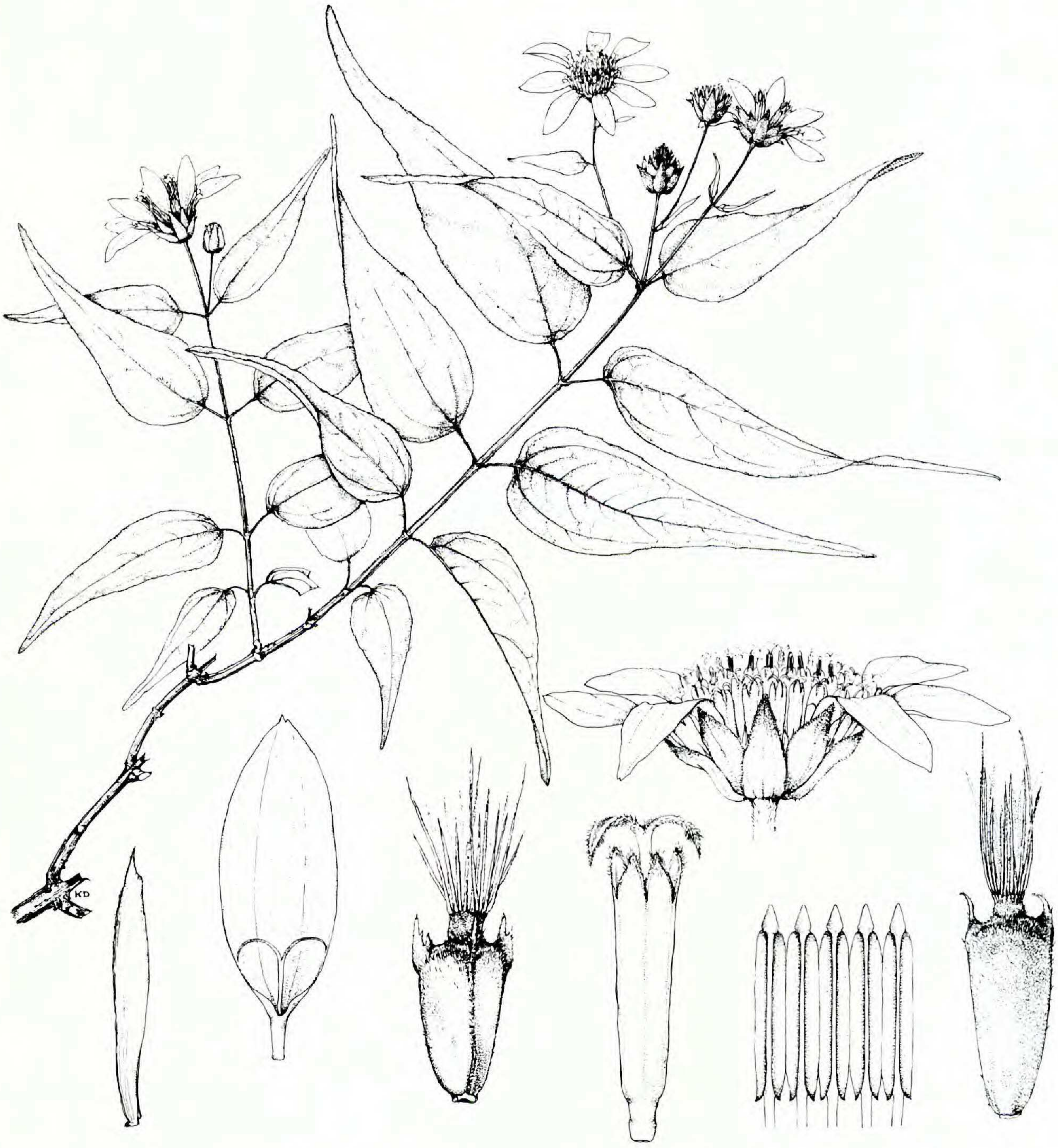

FIG. 40. *Perymenium wilburorum* (*Wilbur & Wilbur 1751*, type). Flowering branch, X ½; flowering head with one ray removed, X 1.5; ray-corolla, X 2.5; pale, disk-corolla, ray-achene (left), and disk-achene, X 5; anthers, X 7.5.

pallida rigidiusculaque, acuta vel subacuta, subaequalia (vel extima 1–3 intimaque 1–3 minora), majora radios plerumque subtendentia, 8–11 mm longa, 2.5–3.5 mm lata; flores radii 7–9, ligulis aureis 12–15 mm longis, oblongo-lanceolatis 4–5 mm latis, tubo 1–1.5 mm longo; styli ramuli 1.5–2.5 mm longi, apicibus attenuatis; flores disci ca 40, corollis aureis 6.5–7 mm longis, tubo 1.3 mm longo, fauce subcylindrica, lobis triangularibus hispidis, acutis; antherae brunneae, 2.2–2.5 mm longae, appendicibus acutis triangularibus 0.5–0.7 mm longis; styli ramuli 2 mm longi, adaxiale applanati, apicibus longe attenuatis acutis abaxiale pilosis; achaenia disci biconvexa, 3.3 mm longa, distaliter 1.5 mm lata, saltem angulo adaxiali prope apicem anguste alata, ala in arista alata 0.5 mm longa producta; apex achaenii rotundatus, corona cupuliformi 0.5 mm alta pappum ferentia superatus; achaenia radii 3-angulata, 1–3-alata, 1–3-aristata; pappus (disci) ex setis 2 grossis 3–4.5 mm longis (interiore paullo vel multo longiore), setisque 12–15 gracilioribus 0.5–2.5 mm longis constans; achaeniorum radii pappus similis, arista adaxiali ad 5 mm longa, plerumque quam ceteris multo majore crassioreque; paleae 6–7.5 mm longae, apicibus aristato-acuminatis, hispidulis.

Species in honorem fratrum Wilbur qui anno 1949 in civitate Jalisco plantas siccas pretiosissimas plurimas collectaverunt, dixi.

JALISCO: Interior valley, dry shrub-covered slopes 11–12 km S of Autlán, elev. 1050 m, 15 Jul 1949, *R. L. Wilbur & C. R. Wilbur 1751* (MICH, type); 3 km W of Autlán, 900 m, 13 Jul 1949, *Wilbur & Wilbur 1718*. Otherwise unknown.

For a note on the taxonomic position of this plant, see above under *Perymenium uxoris*, from which *P. wilburorum* may be distinguished by the much larger heads with more numerous flowers.

Porophyllum coloratum (H.B.K.) DC., var. **obtusifolium** (DC.) McVaugh, comb. nov. *Porophyllum obtusifolium* DC. in DC. Prodr. 5: 650. 1836.

Rydberg, in the *North American Flora,* treated *Porophyllum coloratum, P. obtusifolium,* and *P. seemannii* Sch. Bip. as three independent species, distinguishing *P. obtusifolium* on the basis of its pale flowers and obtuse leaves; the other species, with "Corollas more or less purple" and leaves "acute," were distinguished by the habit, *P. coloratum* being described as annual and *P. seemannii* perennial. In fact there appear to be two taxa only. After examination of the types of all three of the above names, I conclude that those of *P. seemannii* and *P. coloratum* represent the same taxon, and that of *P. obtusifolium* another. The two are moderately well separated by the characters in the following key, but scarcely merit recognition as distinct species:

1. Plants annual, diffusely branched, the peduncles (2–) 3–5 (–7) cm long; involucre usually pale but purple-spotted before anthesis; flowers purple; leaves usually with evident division into blade and petiole. *P. coloratum* var. *coloratum.*
1. Plants perennial, or flowering the first year, erect, with stiff short ascending branches, the peduncles 1–2.5 cm long; involucres seldom spotted, usually uniformly purple from the first; flowers purple or greenish white; leaves sessile or tapering to a petiolar base. *P. coloratum.* var. *obtusifolium.*

Porophyllum viridiflorum (H.B.K.) DC. in DC. Prodr. 5: 648. 1836. *Kleinia viridiflora* H.B.K. Nov. Gen. & Sp. 4: 157. 1820. *Porophyllum nutans* Rob. & Greenm. Proc. Am. Acad. 32: 31. 1896.

Since the publication in 1896 of a key to North American species of *Porophyllum,* by Robinson and Greenman, there has been some confusion about the identity of *P. viridiflorum* H.B.K. Recent authors have mostly applied the name *viridiflorum* to a species with thick and often strongly triplinerved leaves, more or less erect heads and 8–11 flowers in a head. This plant is correctly named *Porophyllum lindenii* Sch. Bip. The true *P. viridiflorum,* with membranous and pinnately veined leaves, nodding heads, and (as originally described by Kunth) 15–20 flowers in a head, is the plant known in recent works as *P. nutans* Rob. & Greenm. The type of *P. viridiflorum,* which I studied in Paris in 1970, was collected near Morelia, Michoacán, in an area where *P. lindenii* seems not to have been discovered.

Schkuhria pinnata (Lam.) Cabrera, var. **guatemalensis** (Rydb.) McVaugh, comb. nov. *Tetracarpum guatemalense* Rydb. N. Am. Flora 34: 45. 1914. *Schkuhria anthemoidea* var. *guatemalensis* (Rydb.) Heiser, Ann. Missouri Bot. Gard. 32: 273. 1945.

As I interpret *Schkuhria pinnata* it is a widely distributed species, represented in South America by several taxa and in Nueva Galicia by two moderately well-separated varieties, *S. pinnata* var. *virgata* (Llave) Heiser, and var. *guatemalensis.* In his revision of *Schkuhria,* Heiser treated these taxa as belonging to two different species, but the differences between them are relatively insignificant (e.g. in color, in number of flowers in a head, in dimensions of flower parts, and in geographical range). In habit, and in most morphological details, they are indistinguishable.

Tithonia calva Sch. Bip., var. **lancifolia** (Rob. & Greenm.) McVaugh, comb. nov. *Gymnolomia calva* var. *lancifolia* Rob. & Greenm. Proc. Boston Soc. Nat. Hist. 29: 103. 1899. *Tithonia calva* [subsp.] *lancifolia* (Rob. & Greenm.) Blake, Contr. U.S. Nat. Herb. 20: 430. 1921.

Tithonia koelzii McVaugh, sp. nov.

Arbor laxe ramosa 6–7-metralis, trunco 1.5 m longo, diametro 15 cm, foliis ramisque alternis; partes vegetativae breve pubescentes, caulibus striatis pilis parum implexis contortisque arcte pallideque pubescentibus, pedunculis pilis longioribus erectioribus 0.5–1 mm longis sparsim obsitis; involucrum fere glabrum, phyllariis ciliatis, extimisque interdum breve hispidis; folia tenuia, utrinque viridia, supra pilis plurimis brevibus, arcuato-ascendentibus attenuatis asperata, subtus copiose pilosa, pilis mollioribus, gracilioribus 0.5 mm longis; laminae ovatae, non lobatae, 5–10 cm longae, 3–6 cm latae, acuminatae, basi rotundatae, marginibus non profunde crenato-denticulatis, non decurrentibus, petiolis gracilibus, 2–6 cm longis, basi auriculis parvis rotundatis herbaceis 2–5 mm latis instructis, distaliter abrupte dilatatis, venis majoribus separantibus et sub parte laminae foliacea prolongationem deltoideam formantibus; capitula ca 10 cm lata (radiis extensis mensa), ad apices ramulorum solitaria, pedunculis (4–) 6–10 cm longis, sub capitulis subinflatis, in locis latioribus 2–5 mm crassis; involucrum hemisphaericum, basi rotundatum, 1.5–1.8 cm altum, sub 2-seriatum; phyllaria 16–23, lata tenuiaque basi rigida multistriataque, apicibus patentibus pallide viridibus, tenuiter herbaceis; phyllaria exteriora (5–8) sterilia, 8–13 mm longa, 4–6 mm lata, anguste ovata vel obovata, acuta vel acuminata; phyllaria media interioraque (radios subtendentia) tenuiora longioraque, usque ad 2 cm longa et 1 cm lata, elliptica, obtusa, intimorum pauca interdum minora, in paleas transientia; flores radii 11–13, ligulis aureis, elliptico-oblanceolatis, 4–5 cm longis, 1.3–1.8 cm latis, tubo 2–3 mm longo, 1.5 mm crasso; styli plerumque manifesti sed ut videtur steriles, ramulis linearibus 2 mm longis, basi sulcatis, apicibus planis, obtusis, spatulatis; flores disci 150–200 vel ultra, corollis aureis 9–9.5 mm longis, tubo proprio crasso 1 mm longo, lobis 1.5 mm longis intus papillosis; antherae flavo-brunneae 4 mm longae, appendicibus ovato-lanceolatis 1 mm longis; styli ramuli 4 mm longi; achaenia disci biconvexa 6–7 mm longa, 2.2–2.7 mm lata, ambitu oblanceolata, tenuimarginata, marginibus appresse pilosis; pappus ex corona rigida, brunnea, erosa, lobulata vel bipartita 1.5–2 mm alta et ca 2 mm lata constans, aristis nullis vel duabus 0.5–0.7 mm longis, partium 2 coronae marginibus adherentibus; achaenia radii sterilia trigona, apice 3 mm lata, ad basin angustam attenuata, longitudine achaenia disci subaequantia, pappo lobato coroniformi 1.5 mm alto; paleae rigidae 8–11 mm longae, plicate 2.2 mm latae, anguste carinatae, emarginatae, apicibus subulato-aristatis 1.5–3.5 mm longis.

Species altera in honorem dixi amici et in terra mexicana comitis Walter Norman Koelz.

JALISCO: Steep rocky mountainsides, on limestone, 12–13 km SW of Pihuamo, in dense deciduous forest with *Plumeria, Ficus, Bursera, Louteridium, Verbesina furfuracea,* elev. 500–600 m, 6 Dec 1959, *McVaugh & Koelz 1504;* 15 Dec 1959, *McVaugh & Koelz 1795* (MICH, type); 19 Nov 1970, *McVaugh 24496.* Known only from the type-locality.

This appears to be a true *Tithonia* in every respect, except that the 2 pappus-awns are reduced to mere vestiges, and the ray-flowers have vestigial pistils and develop large but sterile achenes. The only other comparably arborescent species seems to be *T. fruticosa* Canby & Rose, in which the young herbage is densely and canescently long-pilose, and the petioles are broadly cuneately margined.

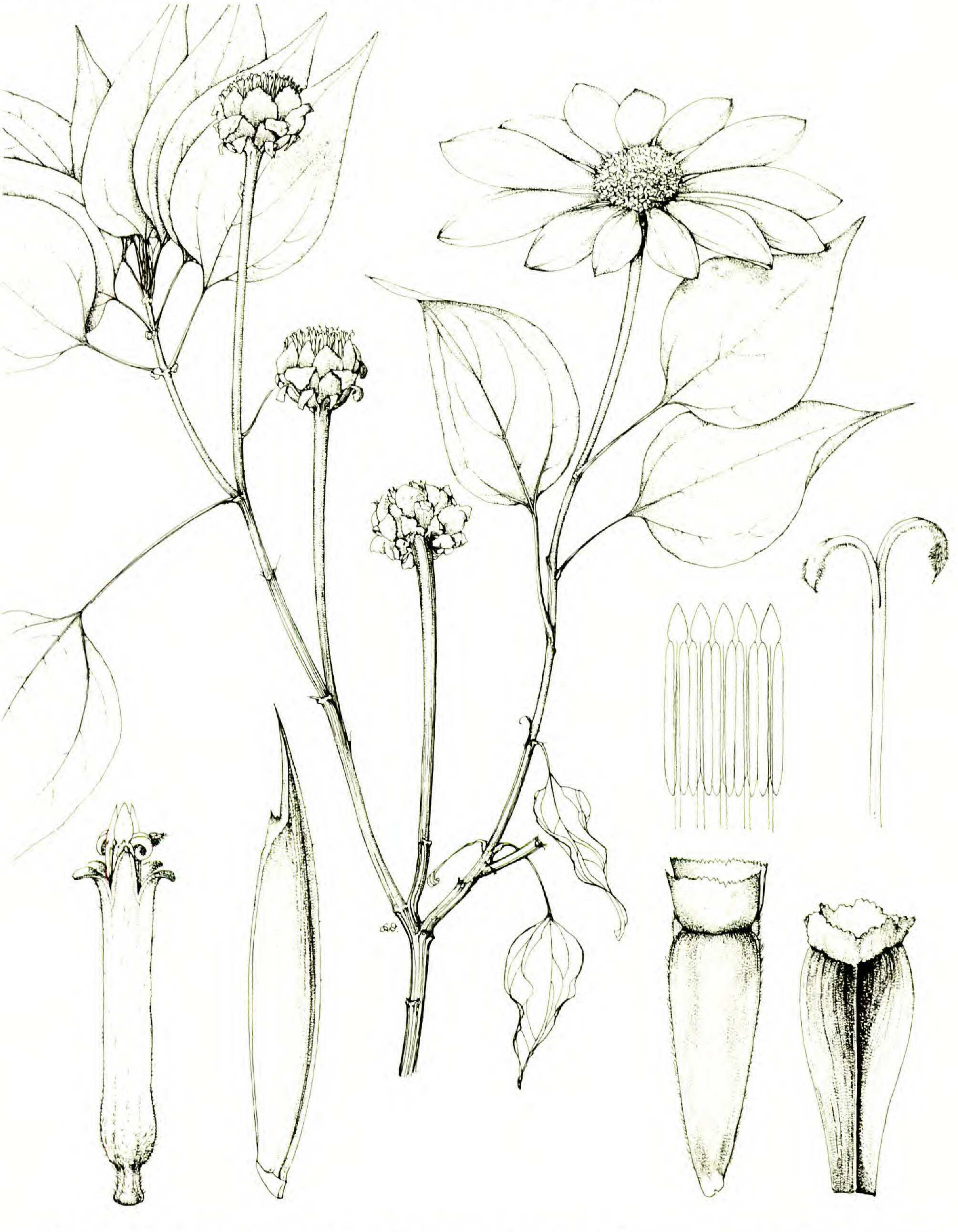

FIG. 41. *Tithonia koelzii* (*McVaugh & Koelz 1795,* type). Flowering branch, X ½; disk-corolla, pale, achenes, anthers and style-tips, X 5.

Verbesina cuautlensis McVaugh, sp. nov.

Herba perennis erecta tenuis, caulibus florentibus paucis 50–90 cm altis, basi 2–3 mm crassis, simplicibus vel supra ramis brevibus erectis instructis, e caudice crasso lignoso interdum ramoso, radices numerosas cordiformes ferenti, oriundis; rami inferiores interdum oppositi, ramorum alis 1–3 mm latis; rami superiores alterni, bracteas alternas angustas saepe ferentes, anguste alati, alis 0.1–0.5 mm latis vel pedunculis inter capitulum et bracteam summam nudis; partes vegetativae asperae, caulibus inferne glabris vel subglabris, involucro pedunculisque minute hispidulis; folis supra pilis erectis brevissimis conicis acutis e discis pallidis erumpentibus instructa, subtus viridissima, venis majoribus crassi- et paucipilosis, cetera glabra vel subglabra; folia caulinia opposita (foliorum paria ca 6–9), penninervia vel subtriplinervia, elliptica vel lanceolata (vel inferiora parva obtusa, ovata vel obovata), sessilia, 3–6 cm longa, 1–2.5 cm lata, apice obtusa vel subacuta, basi cuneata, marginibus denticulatis vel serratis, prope basin integris et in alas caulinas decurrentibus; capitula solitaria vel pauca, saepe ramis longis subnudis ultra folia multo productis suffulta, pedunculis propriis plerumque 1–6 cm longis; capitula florentia non visa, floribus verisimiliter aureis; capitula in statu fructifero 1–1.5 cm lata; involucrum breve campanulatum vel hemisphaericum, basi subtruncatum, 8–9 mm altum, ca 2-seriatum; phyllaria ca 16, exteriora ca 8, crassa, herbacea, oblonga vel spathulata 4–7 mm longa, 1.5–2.5 mm lata, apicibus laxe patentibus; phyllaria interiora (radios subtendentia) 7–9 mm longa, 1.5–2 mm lata, basi rigida, apicibus tenuibus, acutis vel subacutis, viridibus vel coloratis; flores radii ca 8 (–11?), steriles sed pistillo vestigiali et antheris parvis distinctis sterilibus instructi, ligulis ca 1.5 cm longis, 3 mm latis, tubo piloso 2 mm longo; flores disci 40–55, corollis ca 6.5 mm longis, tubo basi dilatato induratoque 1 mm longo, fauce subcylindrica, lobis acutis 1 mm longis; antherae nigrescentes 3 mm longae, appendicibus acutis ovatis 0.6 mm longis; styli ramuli ca 2.5 mm longi, apicibus angustis attenuatis; achaenia disci late obovata, alis inclusis 4.5–5.5 mm longa et 3.5–4.5 mm lata, corpore pallide brunneo 2.7–3 mm lato rare strigoso, alis ciliatis 0.5–1.2 mm latis, supra achaenium productis et ad bases aristarum 2 subaequalium 2.5–3.5 mm longarum adnatis; achaenia radii trigona 1.5–2.5 mm longa; paleae rigidae 8–10 mm longae, plicatae 1.5–1.8 mm latae, multo supra medium dentatae, apicibus tenuibus acutis interdum recurvatis 2–3 mm longis; receptaculum convexum 5–6 mm latum.

JALISCO: Road to Mascota, ca 10 km NW of Cuautla, grassy openings in oak forest, elev. 1850 m, 21 Oct 1952, *McVaugh 13655* (MICH, type); on the new road to Mascota, 6–8 km NW of Cuautla, 1700–1750 m, 9 Oct 1960, *McVaugh 19990.* Otherwise unknown.

In Nueva Galicia there are 9 known species of *Verbesina,* all upright nearly simple herbs with opposite leaves and winged stems, that may be contrasted as in the following key. Four of the species are described as new in this paper:

1. Heads large, mostly 1.5–2.5 cm across the disk; disk-flowers (75–) 100–200 or more; disk-corollas (6.5–) 8–11.5 mm long; rays neutral; peduncles, at least those terminating the branches, winged their whole length.

  2. Outer phyllaries 1–3 cm long, acute or attenuate, longer than the inner series, some or all of them usually spreading or reflexed.

    3. Linear tips of the pales 0.3–0.5 mm wide, hispid; lobes of the disk-corollas evidently puberulent; rays 8–13; long outer phyllaries usually narrowly acute or attenuate; leaves often hastately or pinnately lobed, seldom conspicuously serrate. *V. pantoptera* Blake.

    3. Linear tips of the pales 0.8–1.4 mm wide, glabrous; lobes of the disk-corollas glabrous; rays 15–22; long outer phyllaries usually short-acute; leaves not lobed, coarsely and doubly serrate. *V. hispida* McVaugh.

  2. Outer phyllaries 1 cm long or less, obtuse, evidently shorter than the inner series, appressed or loosely spreading.

    4. Leaves elliptic or oblanceolate, gradually narrowed to a sessile base; ray-flowers 11–13; lower valley of the Río Grande de Santiago. *V. tequilana* Coleman.

    4. Leaves with ovate or deltoid blade abruptly narrowed to a wing-margined petiolar base; ray-flowers 15–22; eastern Jalisco to eastern Mexico. *V. tetraptera* (Ort.) A. Gray.

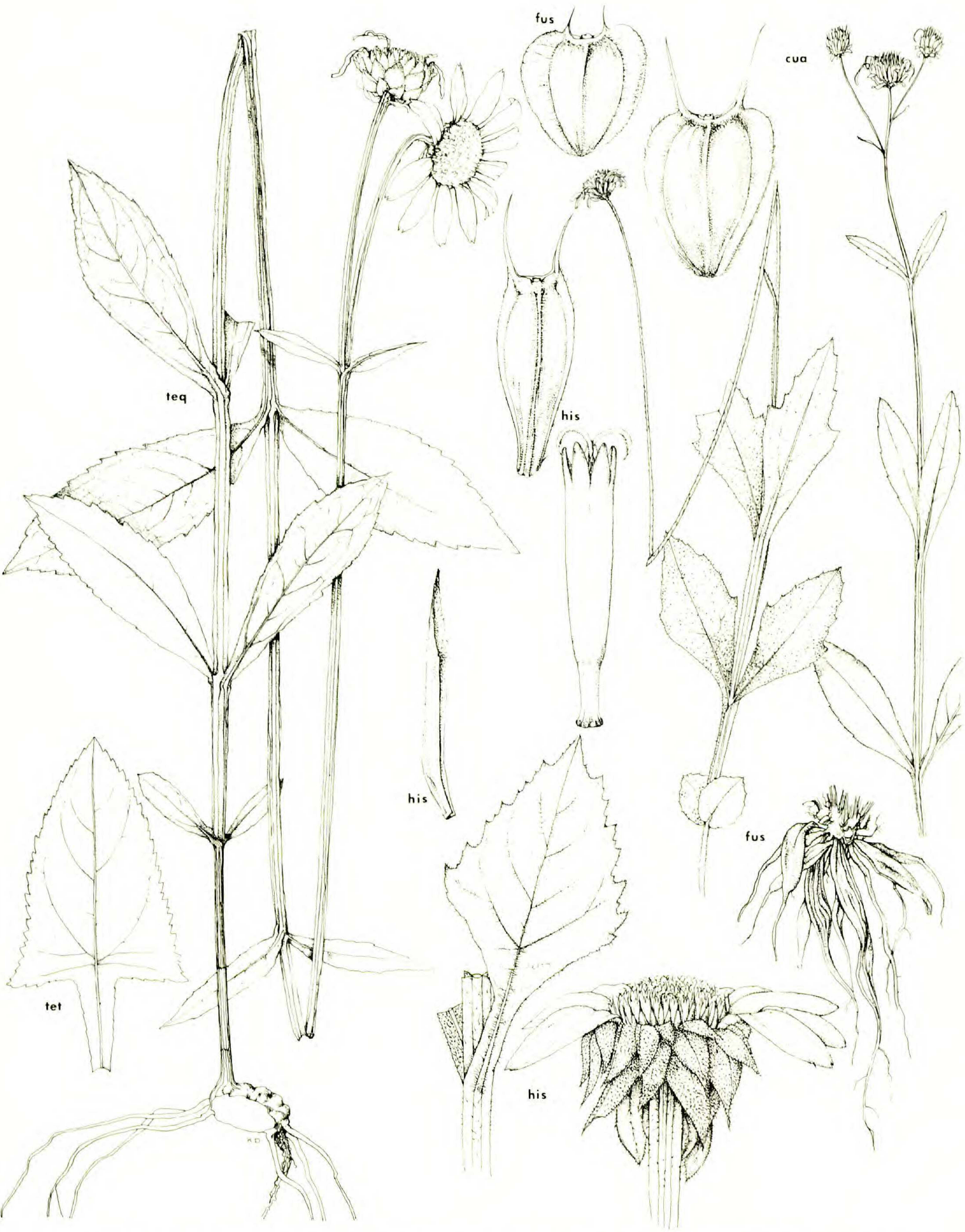

FIG. 42. Herbaceous species of *Verbesina*. **teq,** *V. tequilana* (*McVaugh 19074,* flowering plant, X ½). **tet,** *V. tetraptera* (*McVaugh 21932,* cauline leaf, X ½). **his,** *V. hispida* (*McVaugh 16582,* type; cauline leaf, X ½; flowering head with some ray-flowers removed, X 3/4; pale, X 2.5; disk-corolla, X 3.5; disk-achene, X 4). **cua,** *V. cuautlensis* (*McVaugh 19990;* flowering branch, X ½; disk-achene, X 4). **fus,** *V. fusiformis* (*McVaugh 16428,* type; flowering branch and cluster of fusiform roots, X ½; disk-achene, X 4).

1. Heads small, 1–1.5 cm across the disk; disk-flowers (30–) 40–60 (–75?); disk-corollas 5–6.5 mm long; rays neutral, or in some species pistillate and fertile; peduncles wingless at least above the upper cauline bracts.
  5. Lower leaf-surface essentially glabrous, bearing a few coarse hairs on the larger veins; pappus-awns 2.5–3.5 mm long; stems commonly branched above, with small bracts scattered along the peduncle-like branches. *V. cuautlensis* McVaugh.
  5. Lower leaf-surface evidently pubescent, usually coarsely and copiously so; pappus-awns less than 2 mm long; stems branched or with long naked solitary peduncles.
    6. Leaves sparsely short-strigose beneath, the hairs appressed, 0.2–0.3 mm long; leaves lance-ovate, sessile, denticulate; pappus awns about 1 mm long; foothills of northern Nayarit. *V. rosei* Rob. & Greenm.
    6. Leaves with numerous, coarse, rigid, more or less erect hairs beneath; leaf-shape and margins various.
      7. Herbage scabrous, the hairs on the leaves and the cauline wings seldom more than 0.5 mm long; awns of the disk-achenes 0.2–0.3 mm long, often appearing as minute projections on the mature achene-wing; roots never tuberous-thickened as far as known.
        8. Rays pistillate and fertile; heads solitary and terminal on naked peduncles 15–35 cm long; outer phyllaries green and leafy, 4–7 mm long, evidently different from the inner series, these 8–12 mm long; Durango to México. *V. pedunculosa* (DC.) Rob.
        8. Rays neutral; heads solitary or few, long-peduncled; phyllaries subequal, green, linear-lanceolate, 6.5–8.5 mm long; northern Nayarit. *V. madrensis* Greenm.
      7. Herbage hispid, many of the longer hairs on leaves and wings 1–1.5 mm long; awns of the disk-achenes 1–1.8 mm long; rays neutral; roots fusiform, 4–6 mm thick; southern Nayarit. *V. fusiformis* McVaugh.

Verbesina culminicola McVaugh, sp. nov.

Frutex procerus arboriformis 3-metralis, trunco basi 5 cm diametro, ramis erectis plerumque alternis, infra foliorum bases alatis, alis 1–2.5 mm latis, valde corrugatis, mox siccatis fragilibusque; partes vegetativae pilis gracilibus appressis 0.2–0.5 mm longis rare strigosae; rami hornotini, involucri basis pedunculique pilis similibus paullo dealbati; folia rigidiuscula, laevia, alterna vel ramorum brevium sterilium opposita, elliptici-lanceolata, ad basin apicemque subaequaliter attenuata vel apice acuta tantum sed basi attenuata, 8–20 cm longa, 1.5–3 cm lata, 4–7-plo longiora quam latiora, dentibus remotiusculis utroque latere 8–12 non profunde serrulata; petioli 0.5–1 cm longi, vel foliorum superiorum breviores; corymbus compositus polycephalus, densiusculus, 5–15 cm altus latusque ramis a bracteis anguste ellipticis vel oblanceolatis 0.5–4 cm longis subtentis; capitula hemisphaerica vel subglobosa, 6–8 mm alta, 8–10 mm lata, terminalia et axillaria, pedunculis 0.5–2 cm longis; involucrum 2-seriatum, phyllariis 10–11 sed ut videtur 5 solum, exterioribus herbaceis, interioribus carnosulis, ad paleas transientibus; phyllaria exteriora 5, 3–6 mm longa, 1–2.5 mm lata, basi angusta pallida rigida, apicibus crasse herbaceis, venosis, ampliatis, ellipticis vel spathulatis, obtusis vel subacutis; phyllaria interiora (radios subtendentia) plerumque carnosula, apiculata vel acuminata, ovata, 1–1.5 mm longa, vel unum ad 3 mm longum, apice viridi; flores radii 5–6, feminei, fertiles, ligulis flavis ca 5 mm longis, 2.5 mm latis, tubo piloso minus quam 1 mm longo; styli ramuli ca 1 mm longi, apicibus planis attenuatis; flores disci 40–50, corollis flavis 3.5 mm longis, tubo crasso piloso 0.5–0.8 mm longo, fauce subcylindrica, lobis subacutis 0.6 mm longis, glabris vel rare hispidulis; antherae pallide brunneae. 1.3–1.5 mm longae, appendicibus acutis 0.3–0.4 mm longis; styli ramuli ca 1 mm longi, apicibus deltoideo-acuminatis dilatatis; achaenia disci obovata alis inclusis 2–2.3 mm longa lataque, corpore nigrescenti, supra strigoso, alis albidis, dense ciliatis, 0.2–0.5 mm latis, supra achaenium productis et ad bases aristarum 2 subaequalium 1.3–1.5 mm longarum paullo adnatis; achaenia radii similia sed plerumque minora, saepe sub-3-angulata, vel ala aristaque interiore solum evoluta; paleae rigidae 2.5–3 mm longae, plicatae 1 mm latae, anguste carinatae, basi pallidae angustae, apicibus carnosulis, flavidis, apiculatis, cucullatis, apiculis erectis; receptaculum conicum, 1.5–2 mm altum latumque.

JALISCO: 25–30 km SE of Talpa de Allende, ca 20 km S of El Rincón, steep mountainsides above Aserradero La Cumbre, in fir forest with *Podocarpus* and deciduous trees, elev. 2000–2250 m, 29 Nov 1960, *McVaugh 21536* (MICH, type). Otherwise unknown.

This species is evidently related to the group that includes *Verbesina oncophora* Rob. & Seat., and *V. angustifolia* (Benth.) Blake. In all these the leaves are chiefly alternate, the stems tend to be winged, the ray-flowers are relatively small, and the pales a little fleshy, apiculate, truncate or hooded, often recurved at maturity. In *V. oncophora* the leaves are wider, 2.5–7 (–12) cm wide, 2.5–4 times as long as wide, with (15–) 25–50 teeth on each side. In *V. angustifolia* and *V. culminicola* the leaves

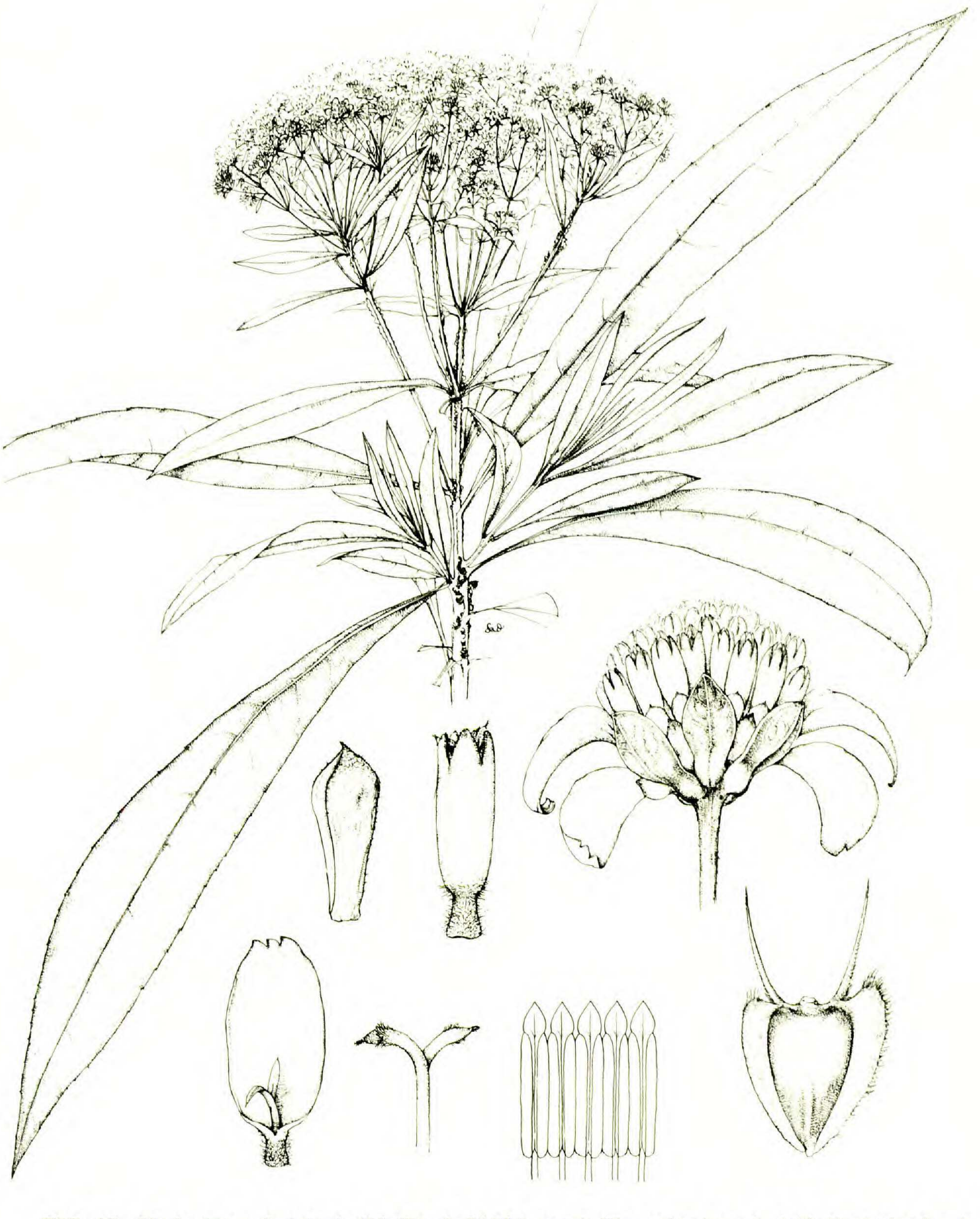

FIG. 43. *Verbesina culminicola* (*McVaugh 21536*, type). Flowering branch, X ½; flowering head, X 3.5; corollas, and pale, X 7.5; disk-achene, anthers, style-tips, X 10.

are seldom more than 3 cm wide, (4–) 5–8 (–12) times as long as wide, with (0–) 6–12 (–25) teeth on each side. In *V. angustifolia* the rays are mostly 8–13, the phyllaries 13–23, without marked contrast between inner and outer series, the tips of the pales recurved, and the leaves usually rough above.

Verbesina furfuracea McVaugh, sp. nov.

Arbor 5–7-metralis, trunco basi 20–30 cm diametro, ramulis vetustis dense basibus pilorum confertorum crassorum flavido-alborum obsitis; rami oppositi, alis

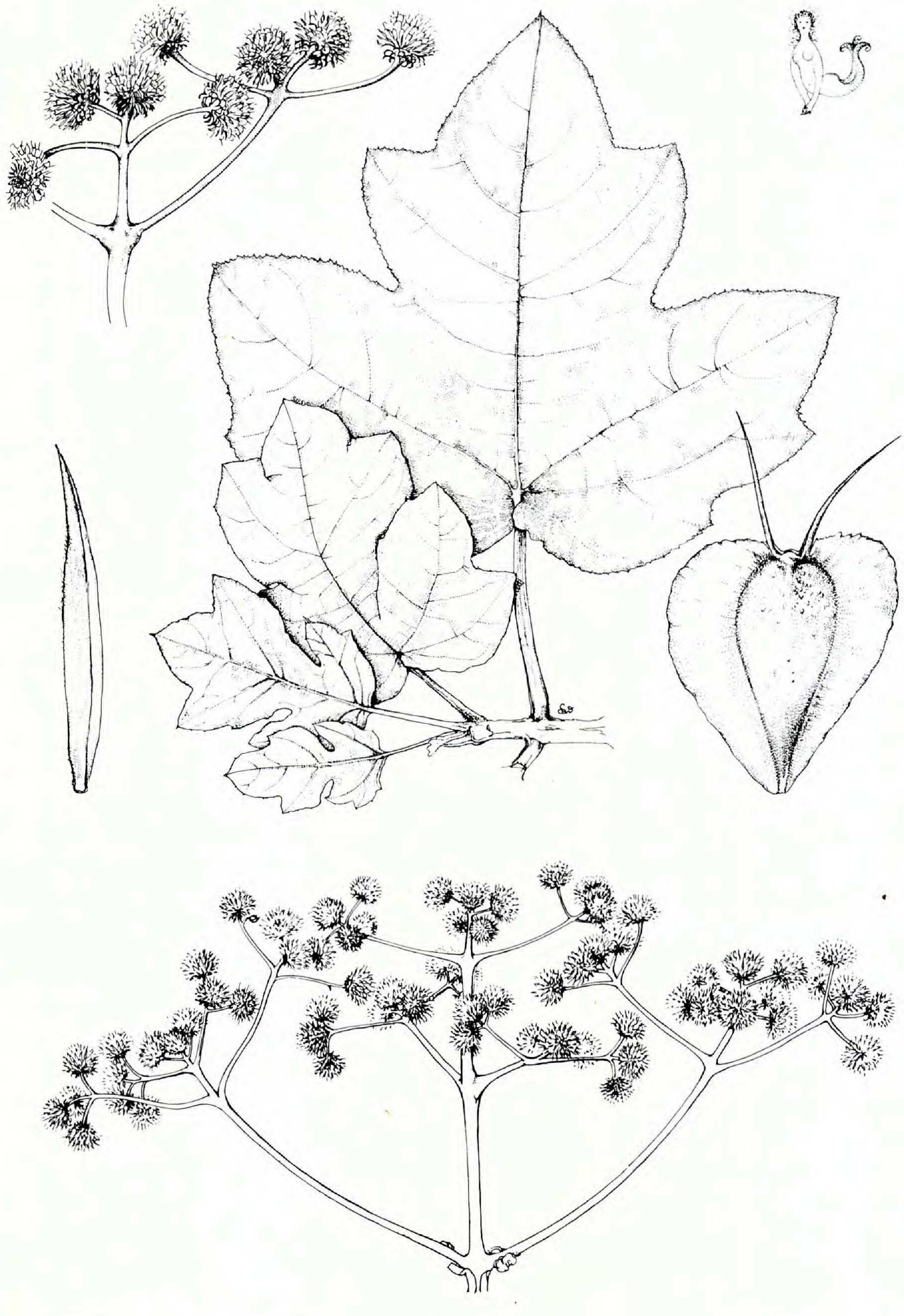

FIG. 44. *Verbesina furfuracea* (*McVaugh 24695*, paratype). Leafy branch and diagram of terminal part of fruiting inflorescence, X ¼; detail of inflorescence, X ½; disk-achene and pale, X 5.

nullis; folia supra pilis plurimis brevibus erectis rigidis subasperata, subtus pallida, valde reticulato-venosa, juvenilia velutino-canescentia, in venis praecipue pilis plurimis gracilibus molliusculis ascendentibus 0.3–0.5 mm longis obsita; folia magna, grossa, ovata, 15–30 cm longa, 10–16 (–30) cm lata, apice late acuta vel obtusa, basi late rotunda subcordata, denticulata, pinnatilobata, lobis utroque latere 1–2, deltoideo-ovatis acutis, 3–6 (–12) cm longis; petioli subteretes 3–10 cm longi, 2–5.5 mm crassi; inflorescentia verisimiliter dense pilosa vel hirsuta (emerita tantum visa), corymbosa, ad 30 cm alta lataque; capitula 10–15, vel usque ad 100, pedunculis terminalibus crassis (0.3–) 1–2.5 cm longis, lateralibusque gracilioribus et ut videtur ebracteatis 2–5 cm longis suffulta; capitula statu fructifero subglobosa, 1.5–2.5 cm diametro; phyllaria ca 15 crassa, ut videtur viridia, ovato-triangularia, subacuta 1.5–4 mm longa, exteriora ut videtur breviora; flores non visi; flores disci ca 75–100; achaenia late obovata, alis inclusis 5–7.5 mm longa et 4–5.5 mm lata, corpore griseo glabro 1.7–2 mm lato, alis 1.5–2 mm latis, albidis, ciliatis, supra achaenium productis et ad bases aristarum 2 inaequalium vel subaequalium 3–5 mm longarum adnatis; paleae lineares, statu fructifero coriaceae 7–9 mm longae plicatae 0.8 mm latae, apicibus acutis, saepe paullo recurvatis; receptaculum 5–6 mm latum.

JALISCO: Steep rocky mountainsides, on limestone, 12–13 km SW of Pihuamo, in dense deciduous forest with *Plumeria, Ficus, Bursera, Louteridium, Tithonia koelzii,* elev. 500–600 m, 6 Dec 1959, *McVaugh & Koelz 1524;* 19 Nov 1970, *McVaugh 24448* (MICH, type).

MICHOACAN: 15–16 km SE of Aserradero Dos Aguas and nearly west of Aguililla, on tumbled and eroded limestones, with *Plumeria, Bursera, Louteridium,* elev. 1400–1450 m, 25–26 Nov 1970, *McVaugh 24695.*

This is a distinctive plant of the limestone areas in Jalisco and western Michoacán that support a number of other narrow endemics. It seems clear even in the absence of flowering material that it is markedly different from any known species of *Verbesina.*

Verbesina fusiformis McVaugh, sp. nov.

Herba perennis erecta tenuis, caulibus florentibus paucis ad 50 cm altis, simplicibus, capitulum solitarium terminale longipedunculatum erectum ferentibus, e caudice brevi lignoso interdum ramoso, radicum tuberosarum fusiformium 4–6 mm crassorum fasciculum efferenti, oriundis; caules foliosi alati, alis 4, 0.5–3 mm latis, pedunculis nudis exalatis 15–35 cm longis, 1–1.7 mm crassis, characteribus omnis ut in *Verbesina pedunculosa* sed partibus vegetativis grosse hispidis non rare hispidulis; caules inferne hirsuti, pedunculis involucrisque pilis rigidis appressis 0.4–0.8 mm longis obsitis; folia pilis conicis erectis 0.5–1 mm longis scabra, pilis supra e discis cellularum vitrearum erumpentibus, subtus in venis numerosioribus, discis cellularum vix prominentibus; folia sessilia, (1.5–) 3–6 cm longa, (1–) 1.5–3 cm lata, obovata vel superiora oblanceolata vel elliptica, apice obtusa vel subacuta, basi cuneata vel sensim angustata, interdum prope medium oblique bilobata (lobis deltoideis ad 5–8 mm altis), marginibus irregulariter acuteque dentatis vel denticulatis; capitula florentia non visa, statu fructifero hemisphaerica vel subglobosa 1–1.7 cm lata, involucro subrotato; phyllariis biseriatis ca 17–20; phyllaria exteriora viridia 6–8, crassa, foliacea, laxiuscule patentia, oblonga, obtusa, 4–6 mm longa, 1–1.5 mm lata; phyllaria interiora (radios subtendentia) 6–8 mm longa, lanceolata vel elliptico-lanceolata, acuta vel subacuta, apicibus viridibus, vel tenuioribus et phyllariis ad paleas plusminusve transientibus; flores radii ca 11–13, steriles, ut videtur neutri; flores disci ca 50, corollis ca 5 mm longis, basi dilatatis induratisque; antherae ca 3 mm longae, appendicibus ovatis acutis 0.6 mm longis; achaenia disci late obovata, alis inclusis 4.5–5.5 mm longis, 4–5 mm latis, corpore glabro pallide brunneo 2.5–2.9 mm lato, alis cartilagineis ciliatis 0.5–1.3 mm latis, supra achaenium productis et ad aristas 2 aequales vel subaequales 1–1.8 mm longas adnatis; paleae papyraceae 7–8 mm longae, plicatae 1–1.5 mm latae, apicibus longiciliatis acutis attenuatis.

NAYARIT: In oak forests with scattered pines, km 870, ca 35 km SE of Tepic, elev. 1150 m, 26 Aug 1957, *McVaugh 16428* (MICH, type). Known only from the type-collection.

This species is superficially very similar to *V. pedunculosa* (DC.) Rob.; see the key above, under *V. cuautlensis. V. pedunculosa* is a species known chiefly from the Central Plateau of Mexico, at elevations of 1900 to 2300 m. It differs from *V. fusiformis* in a number of individually trivial characters (e.g. pubescence, achene-shape, and size of pappus awns), and also in some ways not yet fully understood. Fusiform roots like those of *V. fusiformis* have not been observed in *V. pedunculosa,* and in the latter species the rays are consistently fertile as far as known, whereas in all the plants of the type-collection of *V. fusiformis* they appear to be sterile.

Verbesina hispida McVaugh, sp. nov.

Herba perennis erecta, caulibus florentibus solitariis vel paucis, exemplis visis 30–60 cm altis, 2–5 mm crassis, simplicibus, quadrialatis (alis 1–3.5 mm latis), capitulo solitario pedunculum alatum 6–20 cm longum terminanti; planta omnino hispida, caulibus inter alas pilis paucis instructis; folia supra scabra, pilis erectis rigidis conicis curvatis 0.5–1 mm longis e discis pallidis cellularum vitrearum erumpentibus crebre obsita; folia subtus pilis grossis 1–2.5 mm longis e cellulis 4–7 compositis in venis instructa, inter venas plerumque glabra; folia (pedunculi bracteis exceptis) opposita, 10–12, subtriplinervia, laminis ovatis 5–9 cm longis, 3–7.5 cm latis, rhomboideis vel deltoideis, apice acutis vel breviacuminatis, basi abrupte contractis (marginibus basalibus fere rectis), petiolis marginatis oblongis vel cuneatis 2.5–5 cm longis, prope laminam 0.8–2 cm latis, prope basin 0.5–1 cm latis et in alas caulinas decurrentibus; margines laminarum utroque latere dentibus 5–10, 1–7 mm altis grosse duplicato-serratae, dentibus primariis plerumque dentatis vel denticulatis; folia superiora inferioraque minora; internodia superiora 8–16 cm longa; capitula magna, sub anthesi nutantia, fructu erecta, 4–6 cm lata (radiis extensis mensa), disco 1.5–2 cm lato; involucrum 2–3-seriatum, verisimiliter initio hemisphaericum, phyllariis exterioribus mox laxe patentibus vel reflexis; phyllaria ca 40–50, lanceolata vel elliptica vel oblanceolata, exteriora longiora, subaequalia, crassa, herbacea, rigide hispida, 1.2–2 cm longa, 4–6 mm lata, apicibus acutis callosis; phyllaria (radios subtendentia) breviora angustioraque, 1–1.5 cm longa, 2–4 mm lata, basi pallida rigida, apicibus acutis viridibus vel scariosis, intima ad paleas sensim transientia, ciliata, cetera glabra vel subglabra; flores radii 15–22, neutri, ligulis flavis 1.5–2.5 cm longis, 4–6 mm latis, tubo glabro 2.5–4 mm longo, basi dilatato induratoque; flores disci numerosi (150–200 vel ultra), corollis flavis 10–11.5 mm longis, extus glabris, tubo 2–2.5 mm longo, 1–1.3 mm crasso, basi dilatato induratoque, fauce subcylindrica, lobis subacutis angustis incurvatis 2–2.3 mm longis, marginibus intus minute ciliatis; antherae nigrescentes 3.3–4 mm longae, appendicibus acutis breviovatis 0.4 mm longis; styli ramuli 3.5–4.5 mm longi, apicibus angustis attenuatis; achaenia disci (paullo immatura) obovata, alis inclusis 5.5–7 mm longa, corpore glabro 2–2.5 mm lato, alis ciliatis distaliter 0.3–0.7 mm latis, supra achaenium productis, ad bases aristarum subulatarum 2 subaequalium, 1.5–4 mm longarum adnatis, et inter aristas margine angustissima connexis; achaenia radii trigona, abortiva; paleae rigidae 11–13.5 mm longae, plicatae 1.3 mm latae, lateribus plerumque brevidentatis, apicibus linearibus glabris, acutis vel acuminatis 4–5 mm longis, 0.8–1.4 mm latis, subrecurvatis; receptaculum convexum.

NAYARIT: Steep treeless grassland hills ca 16 km SE of Tepic (3 km SE of El Refugio), elev. 1000–1100 m, 30 Aug 1957, *McVaugh 16582* (MICH, type); grassy openings above the lake, NE of Santa María del Oro, elev. 1000 m, 18–20 Aug 1959, *Feddema 655, 690.* Otherwise unknown.

This species superficially resembles *Verbesina pantoptera* Blake, from which it can readily be distinguished by the characters used in the key above (under *Verbesina cuautlensis*).

Verbesina mickelii McVaugh, sp. nov.

Frutex erectus copiose ramosus 2–3-metralis, ramis foliisque plerumque oppositis, ramulis teretibus vel angulatis, vix alatis; partes vegetativae sublaeves, pilis rigidis

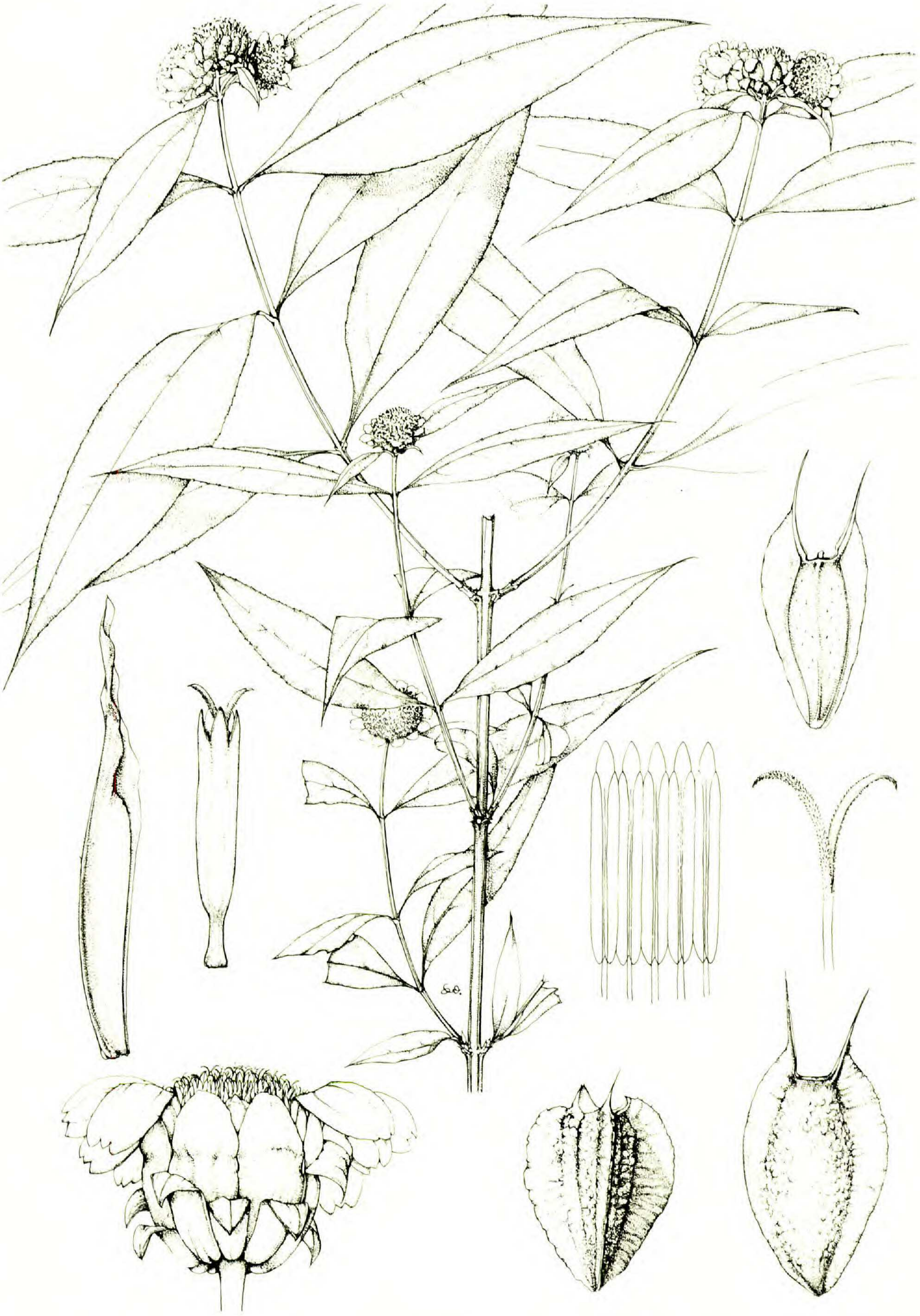

FIG. 45. *Verbesina mickelii.* Flowering branch, X ½; flowering head, X 1.5; disk-corolla, pale, immature achene (right center), X 5; style-tips, X 7.5; anthers, X 10 (all from the type, *McVaugh 16054*). Disk-achene (lower right) and ray-achene, X 5 (*McVaugh 24962*).

pallidis appressis ca 0.1–0.3 mm longis aequaliter sed sparsiuscule obsitae; folia membranacea, lanceolata, penninervia, 8–13 cm longa, 2–3.5 cm lata, 3.7–5-plo longiora quam latiora, apice attenuata vel anguste acuminata, basi paullo rotundata, cuneata, sessilia vel petioli parte nuda 1–2 mm longa, marginibus supra basin utroque latere dentibus 12–20 serrulato-denticulatis; capitula terminalia solitariaque, pedunculis incrassatis ad 1 cm longis et 1–2 mm crassis suffulta, vel 2–3 in fasciculis terminalibus conferta, hemisphaerica vel demum subglobosa, 3 cm lata (radiis extensis mensa), disco sub anthesi 1.5 cm lato, fructu 2–2.5 cm lato; involucrum hemisphaericum, ca 3-seriatum, 12–15 mm altum, prope basin late rotundatum vel subtruncatum ca 1 cm latum; phyllaria ca 21–24, foliacea vel membranacea, basi rigida, apicibus tenuibus, obtusis vel rotundatis; phyllaria exteriora 8–10 foliacea, 5–10 mm longa, 2–5 mm lata, apicibus laxe patentibus vel reflexis, angustis vel saepe dilatatis, ellipticis vel spathulatis; phyllaria interiora (radios subtendentia) longiora latioraque vel intima angustiora subacuta 2–3 mm lata et ad paleas transientia, omnia membranacea vel majora subfoliacea ad 12–15 mm longa, 5–8 mm lata; flores radii ca 11, ligulis flavis, oblongo-ovatis, apice dentatis, ca 1 cm longis et 5 mm latis, tubo 3 mm longo basi dilatato; styli ramuli longe exserti 2.5 mm longi; flores disci 80 vel ultra, corollis flavis 7.5–8 mm longis, tubo 1.3–2 mm longo, basi dilatato induratoque, fauce cylindro-campanulata, lobis acutis 1–1.5 mm longis; antherae nigrescentes 3 mm longae, appendicibus acutis 0.5 mm longis; styli ramuli breviacuti 2.5 mm longi; achaenia disci obovata, alis inclusis 5–7 mm longa et 3–5 mm lata, corpore nigrescenti brevistrigoso, 1.8–2.2 mm lato, alis albidis 0.3–0.8 (–1.5) mm latis (interiore saepe latiore), supra achaenium productis et ad bases artistarum 2 subaequalium hispidularum canaliculatarum 2–3.5 mm longarum adnatis; achaenia radii trigona, 3-alata, aristis 3 brevibus munita; paleae papyraceae (10–) 12–14 mm longae, plicatae 1.5 mm latae, apicibus mollibus linearibus attenuatis vel acutis.

Species in honorem dixi John Thomas Mickel (1934–   ) nunc noveboracensis, qui mecum plantas praecipue colimenses anno 1957 collectavit.

COLIMA: Mountain summits near the pass 17–18 km SSW of Colima on the Manzanillo road, in deciduous forest over slate and gypsum, elev. 500 m, 10 Aug 1957, *McVaugh 16054* (MICH, type); 21 Sep 1958, *McVaugh 18050;* 3 Dec 1970, *McVaugh 24962.* Abundant at the type locality; otherwise unknown.

Apparently not closely related to any other species in western Mexico, *Verbesina mickelii* differs technically from *V. langlassei* Rob. and *V. sphaerocephala* A. Gray (the other species with opposite leaves and few small or medium-sized short-peduncled and leafy-bracted heads), in having the branchlets not at all or at most obscurely winged, the leafy tips of the outer phyllaries 5–10 mm long and much longer than wide, the fruiting heads 2 cm wide or more, the pales mostly 12–14 mm long and the disk flowers 80 or more.

Verbesina oncophora Rob. & Seat., var. **subhamata** McVaugh, var. nov.

Frutex procerus vel arborescens 2–5-metralis, ramis alternis plerumque alatis; a var. *oncophora* pubescentia sparsiuscula, foliis angustioribus ellipticis (raro ovatis), plerumque 2.5–6.5 cm latis, achaeniis minoribus 2.5–3.4 mm longis, glabris vel distaliter strigosis, paleis rectis vel recurvatis, differt.

TYPE: JALISCO: Sierra de Manantlán, 25–30 km SE of Autlán, in pine and fir forests near the summits between El Chante and Cuzalapa, elev. 2500–2750 m, 20–21 Mar 1965, *McVaugh 23112* (MICH).

A characteristic shrub in the mountains from southern Durango through Jalisco to western Michoacán, in pine or pine-fir forest at elevations from 2000 to 3000 m. The var. *oncophora* is unknown from Nueva Galicia but occurs in Morelos, in the State of Mexico, and the Distrito Federal. The original specimens came from near Mexico City (*Pringle 4310!, Bourgeau 967!,* syntypes, both at GH). The cauline leaves tend to be ovate rather than elliptic, and 5–8 cm wide; the inflorescence is densely short-

pubescent and subcanescent, the achenes are larger and more generally pubescent than those of var. *subhamata*, and the points of the pales may be noticeably recurved, whereas in most specimens from Nueva Galicia the tips are erect or nearly so.

Verbesina sphaerocephala A. Gray, var. **dubia** McVaugh, var. nov.

Frutex var. *sphaerocephalae* habitu characteribusque foliorum et inflorescentiae simillimus, sed foliis anguste ovatis (2–) 2.5–3.5-plo longioribus quam latioribus, subtus pilis arcte appressis 0.3–0.5 mm longis vel brevioribus obsitis.

NAYARIT: SE of Ahuacatlán, 1100–1300 m, 17–18 Nov 1959, *McVaugh & Koelz 734;* between Mazatán and Las Varas, 600–900 m, Aug 1959, *Feddema 1109;* Nov 1963, *Feddema 2658.*

JALISCO: Mountains 8 km NNE of Talpa de Allende, in oak forest, elev. 1500 m, 14 Oct 1960, *McVaugh 20180* (MICH, type); Mpio. de Cabo Corrientes, S of El Tuito, elev. 250–300 m, 15 Dec 1970, *McVaugh 25433;* Mpio. de Tomatlán, Llano Grande, elev. 350 m, 21 Nov 1960, *Feddema [McVaugh 21263]*, 23 Nov 1960, *Rzedowski 15189.*

Rzedowski's plant from Llano Grande is typical of this variety, but Feddema's collection from the same locality is indistinguishable from *V. mickelii* in aspect and in foliage-characters, although the heads are those of *V. sphaerocephala.*

The var. *sphaerocephala* occurs widely from Nayarit to the State of Mexico and Guerrero, apparently ranging inland farther than the var. *dubia.* The leaves tend to be ovate, 1.75–2.5 (–3) times as long as wide, the lower surface bearing many stiff and mostly erect hairs 0.5–0.8 mm long.

Viguiera blakei McVaugh, sp. nov.

Arbor 5–10-metralis, trunco ad 15 cm diametro, ramis foliisque oppositis vel inflorescentiae ramulis ultimis alternis; rami pedunculique crispato-puberulentes, pilis rectis longioribus 0.5–0.8 mm longis etiam instructi; folia supra pilis brevibus conicis attenuatis asperata, subtus in venis pilosa et glanduloso-puberulentia, inter venas subglabra resinoso-globulifera, in venarum axillis barbata, venulis minoribus impressis, pagina inferiore bullata; phyllaria versus apices rare pubescentia, versus basin densiore; folia triplinervia ovata, petiolis marginibus valde corrugatis alatis; folia principalia 25–30 cm longa, 20–25 cm lata, petiolis (e basi ad venarum 3 majorum juncturam mensis) 10–13 cm longis, alis 1–2 cm latis basi subamplexicaulibus; folia superiora (basi inflorescentiae posita) 15–20 cm longa, petiolis 2–4 cm longis; laminae apice acuminatae, basi in petiolum alatum abrupte rotundatae, marginibus utroque latere dentibus ad 50 non profunde crenato-serratis, vel bractearum foliacearum integris; capitula pauca, magna, quoque ramo florenti 10–20; inflorescentia pauciramosa, ramis divaricatis capitulis plerumque binis vel ternis, terminalibus axillaribusque, pedunculis bracteatis 3–10 cm longis, 2 mm crassis; capitula florentia 9–12 cm lata (radiis extensis mensa), disco 3–3.5 cm lato; involucrum late cyathiforme, ad apice pedunculi impressum, ca 3-seriatum; phyllaria 39–45, rigidiuscula, lanceolata, 1.5–2.5 mm lata, ad apices acutos, angustos vel subcapilliformes attenuata, exteriora gradatim breviora, extima 7–11 mm longa, intima (radios subtendentia) 11–14 mm longa; flores radii 19–24, ligulis aureis oblanceolatis 3–4 cm longis, 1–1.5 cm latis, apice obtusis, prope basin abaxiale pubescentibus, tubo pubescenti 3 mm longo; flores disci ca 150, corollis rubro-aurantiacis 8–9.5 mm longis, anguste tubuloso-infundibuliformibus, tubo puberulenti ca 2 mm longo, lobis triangulari-ovatis 1.5–2 mm longis; antherae flavo-brunneae, basi auriculatae, 4 mm longae, appendicibus anguste ovatis 1 mm longis; styli ramuli lineares 3.5 mm longi; achaenia lucida subnigrescentia 6.5 mm longa, compressa, ambitu obovata, 2.5–2.7 mm lata, apice appresse pubescentia; aristae 2 erectae, 7–8.5 mm longae, planae, rigide coriaceae, lineari-ellipticae, 1.5–2 mm latae, marginibus supra medium erosis, apicibus truncatis brevicuspidatisque, basibus per discum planum cartilagineum connexis, disco utroque latere squamellis 1–3 erosis plusminusve unitis 0.1–0.7 mm altis instructo; paleae rigide coriaceae, acuminatae, fructu ca 1 cm longae, in tubum achaenia involventem involutae, apicibus puberulenti-

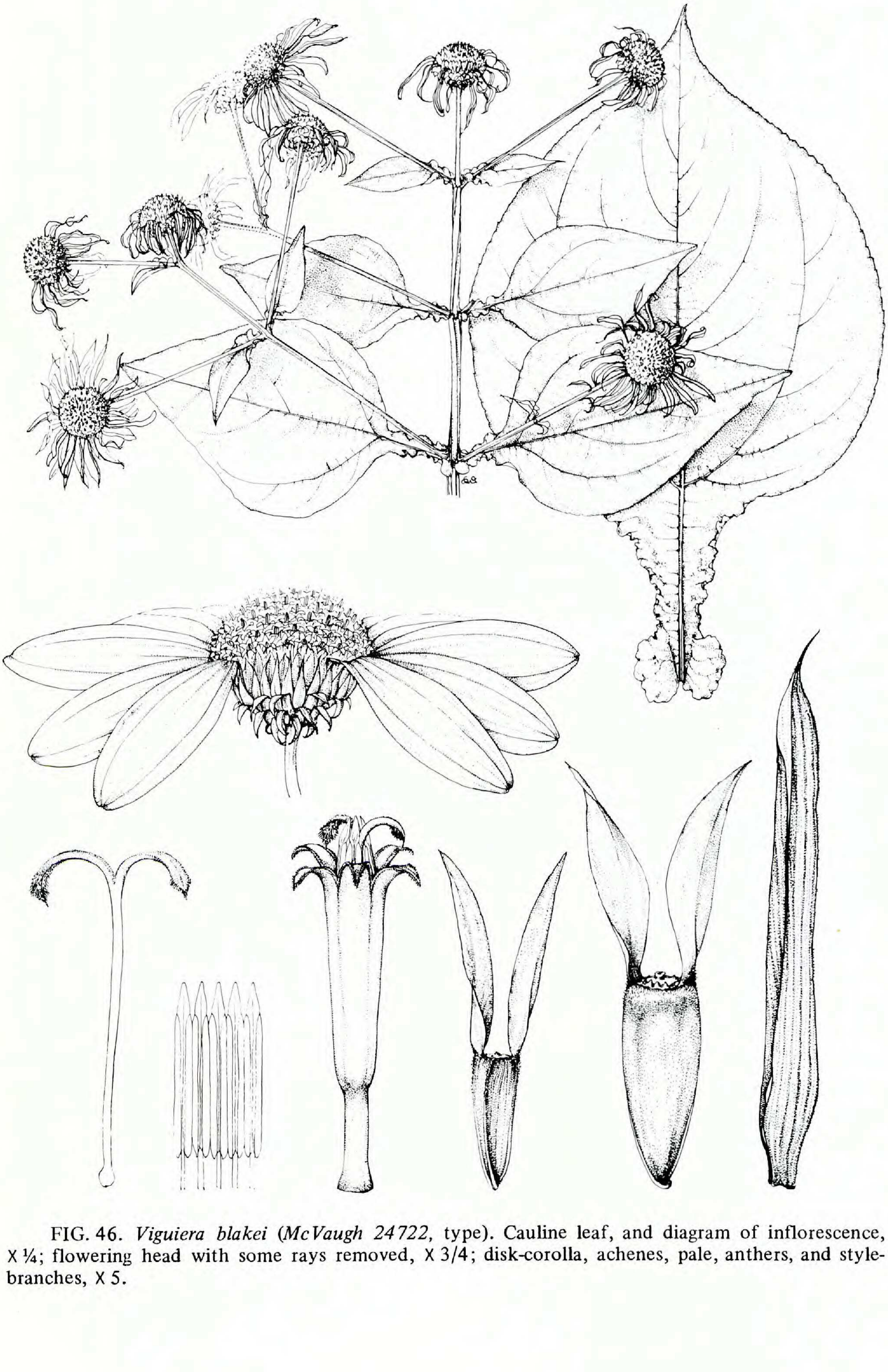

FIG. 46. *Viguiera blakei* (*McVaugh 24722*, type). Cauline leaf, and diagram of inflorescence, X ¼; flowering head with some rays removed, X 3/4; disk-corolla, achenes, pale, anthers, and style-branches, X 5.

bus subaristatis, aristis planis erectis 1 mm longis; receptaculum statu fructifero minus quam 1 cm latum.

Species in memoriam cl. Sidney Fay Blake (1892–1959), Compositarum expositoris singularis, cui inter alia debetur "A revision of the genus *Viguiera,*" dicavi.

MICHOACAN: Coalcomán, on tumbled and eroded limestone rocks, in mixed deciduous forest of *Cordia, Quercus, Bursera, Ficus, Eupatorium,* nearly W of Aguililla and 16–18 km SE of Aserradero Dos Aguas, elev. 1400–1500 m, 26 Nov 1970, *McVaugh 24722* (MICH, type).

MEXICO: Dist. Temascaltepec, Salitre, 7 Nov 1935, *Hinton 8725* (GH).

GUERRERO: Dist. Montes de Oca, Vallecitos, 10 Dec 1937, *Hinton 11653* (GH, MICH); Dist. Mina, Campo Morado to Otatlán, elev. 1200 m, 13 Nov 1939, *Hinton 14833* (GH, MICH).

At the type locality, these trees make an extraordinary show as they come into flower in a thin forest from which many of the leaves have already fallen. From *Viguiera sphaerocephala* (DC.) Hemsl., another arborescent species with large heads and long-petioled leaves, *V. blakei* differs in having petioles with broad ruffled wings extending nearly to the base (petioles wingless in *V. sphaerocephala*), the achenes glabrous except near the apex (not densely appressed-pubescent), the pappus-awns 7–8.5 mm long with squamellae less than 1 mm long (not 3–5 mm long with squamellae 1.5–2.5 mm long).

Viguiera grahamii McVaugh, sp. nov.

Herba perennis basi lignosa 1.5–2-metralis, superne ramosa, diffusa, caulibus teretibus basi 5 mm crassis vel crassioribus; partes vegetativae fere glabrae gummosaeque, pedunculis, phyllariorum apicibus marginibusque et foliis supra plerumque pilis paucis brevibus instructis; folia penninervia, supra plantae medium saltem alterna, utrinque subaequaliter viridia, lanceolata vel late lineari-elliptica, 7–18 cm longa, 0.8–3 cm lata, 6–10 (–13)-plo longiora quam latiora, ad apicem basinque attenuata (apice plerumque quam basi paullo productiore), marginibus remote obscureque denticulatis, petiolis 3–6 mm longis vel brevioribus; inflorescentia laxa polycephala foliosa rotundata paniculiformis 30–50 cm alta, ramis numerosis ascendentibus 10–30 cm longis, capitulis plerumque prope ramorum apices binis vel ternis, terminalibus axillaribusque, pedunculis 0.5–3 cm longis; capitula florentia 3–3.5 cm lata (radiis extensis mensa), disco subgloboso ca 1 cm lato; involucrum late cyathiforme, pedunculi apice profunde impressum, 7–8 mm altum, 8–9 mm latum, manifeste biseriatum; phyllaria 23–26, in siccitate viridia vel basi flavo-brunnea, exteriora subaequalia 11–13, lineari-lanceolata 6–7 mm longa, 0.8–1.6 mm lata, ad apicem induratum attenuata; phyllaria interiora (radios subtendentia) 12–13, 7–8 mm longa, basibus latis; rigidis incurvatis valde striatis, apicibus membranaceis obtusis 2–3 mm latis; flores radii neutri 12–15, ligulis aureis, elliptico-ovatis, obtusis, 10–12 mm longis, 3–4.5 mm latis, tubo puberulenti 1 mm longo; flores disci ca 150, corollis aureis 3.5–4 mm longis, tubo pubescenti 1 mm longo, fauce cylindrica basi ampliata indurataque, lobis ovato-triangularibus 0.7 mm longis; antherae nigrescentes 1.7 mm longae, basi auriculatae, appendicibus rigidis ovatis 0.6 mm longis; styli ramuli ca 1 mm longi, late lineares, apicibus subdilatatis acutis pilosis; achaenia nigrescentia, glabra, paullo compressa 4-angulataque, ambitu obovata 2 mm longa, 0.9 mm lata; pappus nullus; paleae papyraceae, conduplicatae, 4.5–5 mm longae, acuminatae, vetustiores purpureae; receptaculum conicum, statu fructifero 4 mm latum.

Species discipulo adjutorique William Lyle Graham (1946–   ), qui mecum plantas mexicanas praecipue jaliscenses anno 1970 collectavit, nominavi.

JALISCO: Grassy openings near the summit of the highway pass 14–15 km SW of Autlán, in oak-forest, elev. 1200–1300 m, 10 Dec 1970, *McVaugh 25240* (MICH, type); same locality, 28 Dec 1957, *R. Alava & S. A. Cook 1674.*

Known only from the one locality, where Mr. Graham collected the type-material. The following plants are very abundant and conspicuous at the type-locality, and it is surprising that such a showy species has not heretofore been noticed by botanists, many of whom have collected along the same highway in recent years.

In Blake's key to *Viguiera* this at once runs out to *V. latibracteata* (Hemsl.) Blake (subgenus *Amphilepis*), a plant of western Durango and adjacent Sinaloa. *V. grahamii*, however, is more nearly glabrous than *V. latibracteata*, with somewhat smaller heads. From *V. latibracteata* and related species of subg. *Amphilepis*, including *V. flava* (Hemsl.) Blake, and *V. hypochlora* (Blake) Blake, it differs in having pinnately nerved (not triplinerved) and essentially glabrous leaves 6–10 (–13) times as long as wide. In the other species the leaves are usually plainly triplinerved, pubescent or strigose, 2–4.5 (–6) times as long as wide. The characters separating all these and some other

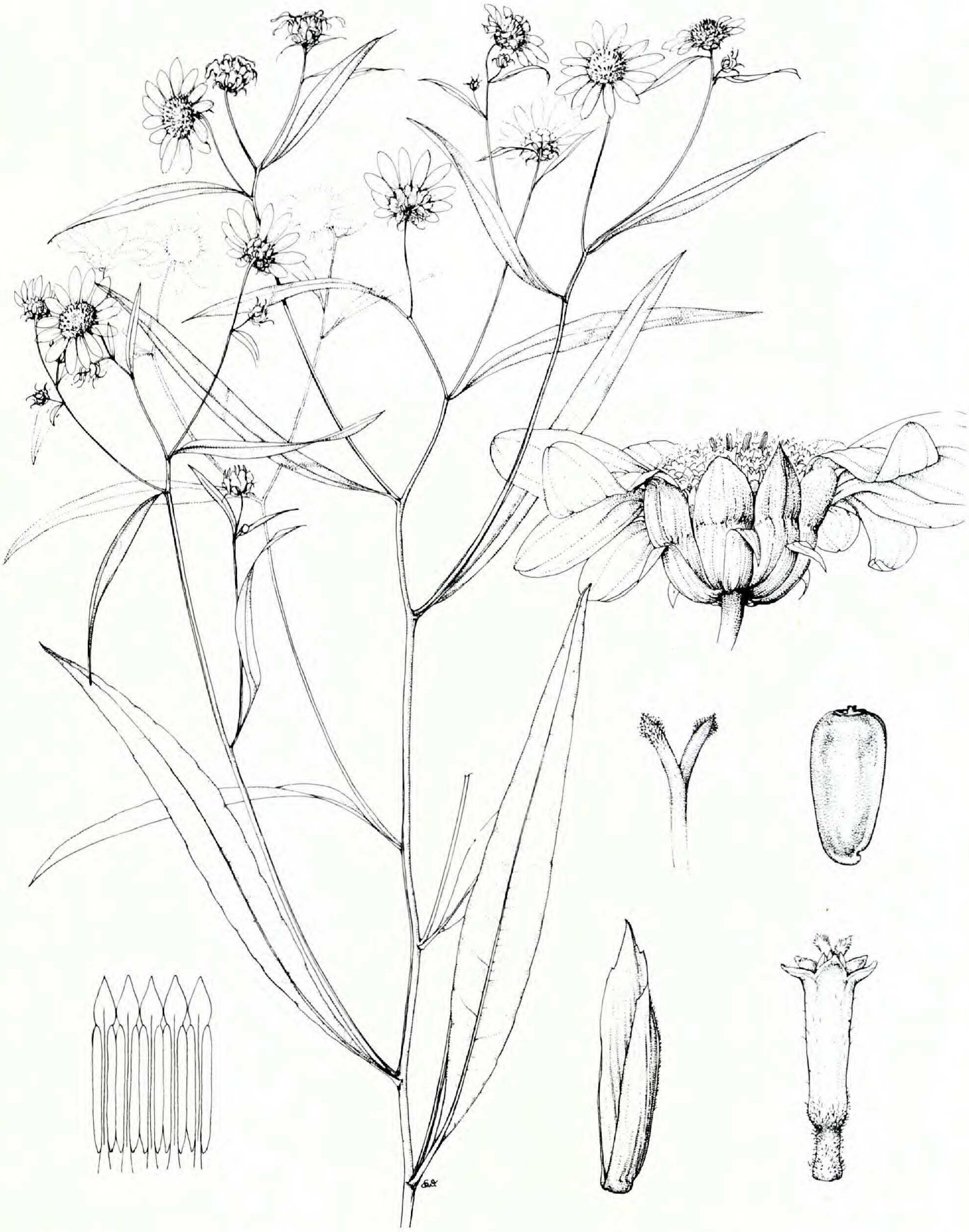

FIG. 47. *Viguiera grahamii* (*McVaugh 25240*, type). Flowering branch, X ½; flowering head with some rays removed, X 2; disk-corolla and pale, X 7.5; anthers, style-tips and achene, X 10.

species are not very well understood, and the group as a whole should be revised when more material becomes available.

Viguiera kingii McVaugh, sp. nov.

Herba annua vel perennis (partibus hypogaeis ignotis) 50 cm alta; caulis solitarius basi 2 mm crassus, purpureus, inferne glaber, superne minute puberulus strigosusque, pedunculis densius strigosis; phyllaria pilis basi crassis quam rami grossius strigosa; folia supra pilis plurimis brevibus rigidis attenuatis asperata, subtus fere glabra, puberula sed non resinoso-globulifera, venis pilis paucis crassis instructis; folia (inferiora opposita, superiora in inflorescentia alterna, minora) triplinervia, ovata, principalia 5–7 cm longa, 3–3.5 cm lata, acuta vel apice obtuso apiculatoque, basi rotundata vel subcordata, marginibus utroque latere dentibus 8–10 remote serratis, petiolis 3–6 mm longis; capitula exemplo typico 9–10, ca 3 cm lata (radiis extensis mensa), in pedunculis axillaribus 6–10 cm longis, vel caulem ramosque pedunculis 2.5–3 cm longis terminantia; involucrum breve campanulatum 11–12 mm altum, 2-seriatum; phyllaria

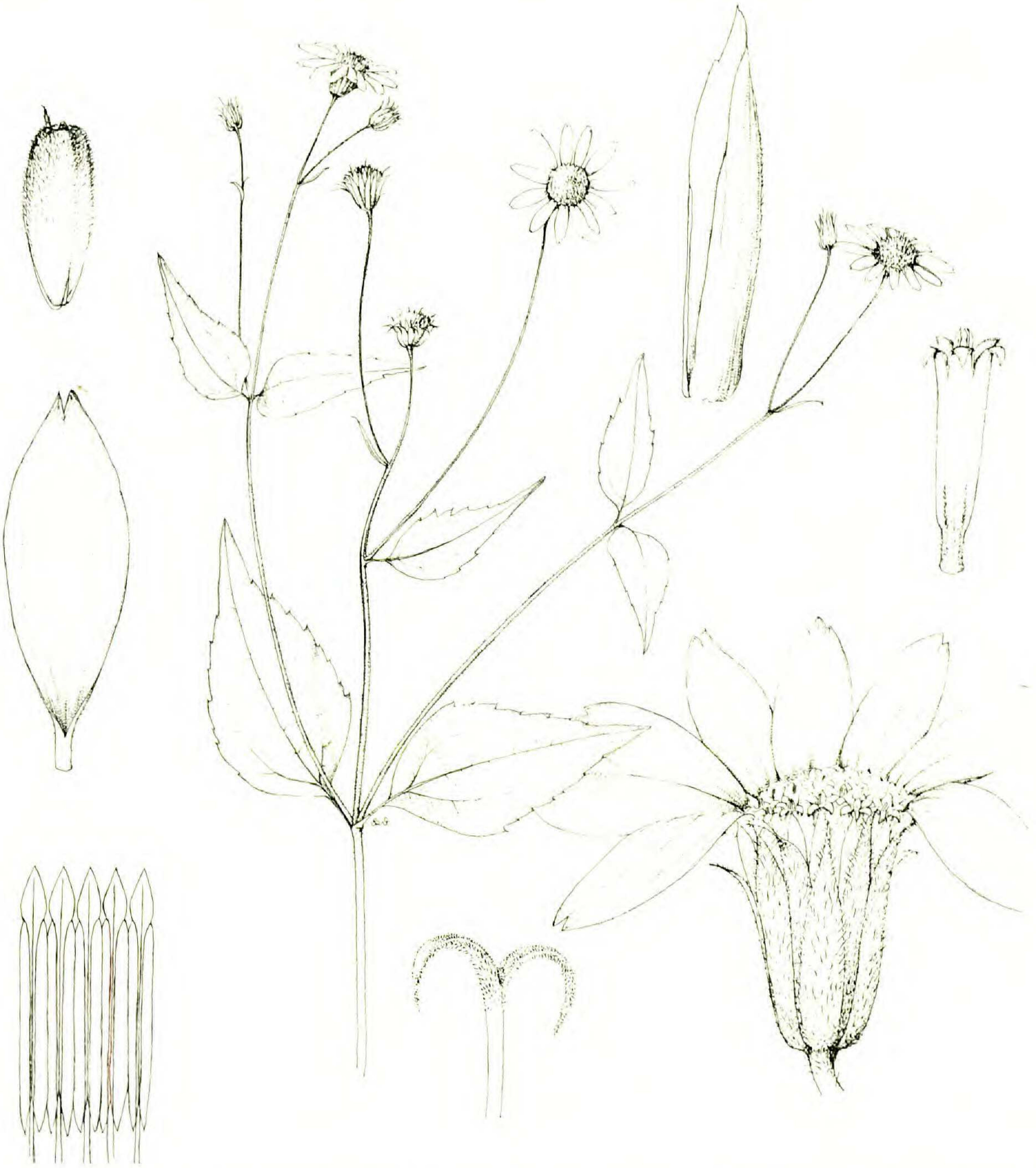

FIG. 48. *Viguiera kingii* (*King 3675*, type). Flowering branch, X ½; flowering head with some rays removed, X 2.5; ray-corolla, X 3.5; disk-corolla, achene, pale, X 5; anthers and style-tips, X 10.

subaequalia ca 13–16, anguste lanceolata, 1.3–2.5 mm lata, ad apices acutos subulatos attenuata, omnino foliacea sed basi subrigida; phyllaria exteriora sterilia 5–6, plerumque quam interiora (radios subtendentia) laetius viridia; flores radii neutri ca 8, ligulis flavis 9–10 mm longis, 3 mm latis, tubo minute pubescenti 1 mm longo; flores disci ca 50, corollis flavis 5 mm longis, tubo 1 mm longo, fauce campanulata, lobis minute hispidulis 1–1.3 mm longis; antherae nigrescentes, 2.2–2.4 mm longae, appendicibus 0.7–0.8 mm longis; styli ramuli 1.5 mm longi, apicibus attenuatis hirsutis; achaenia nigrescentia, clavata, obtuse 4-angulata, apice truncata, 3.7–4 mm longa, 1–1.3 mm lata, arcte appresse pilosa; pappus nullus, vel ex arista solitaria 0.25 mm longa rudimentaria constans; paleae papyraceae 8–8.5 mm longae, valde nervatae, alveiformes, dorso et prope apices acutos, acuminatos, hispidulae.

Species collectori Robert Merrill King (1930–), qui mecum plantas mexicanas plurimas communicavit, nominavi.

NAYARIT: "Fields along route 15," ca 11 mi [17–18 km] SE of Tepic, elev. ca 1000 m, 10 Aug 1960, *King 3675* (MICH, type). Known only from the type-collection.

In *Viguiera* the achenes may be either glabrous or appressed-pilose. Sometimes both forms occur in the same species. Glabrous achenes are usually quite without pappus. Pubescent achenes usually bear awns and squamellae; in fact pubescent but epappose achenes are almost unknown in this genus. It may be that *V. kingii* represents an aberrant plant of a normally pappose species, but I cannot identify it with any known Mexican *Viguiera*, with or without pappus.

Viguiera palmeri A. Gray, var. **rzedowskii** McVaugh, var. nov.

Frutex debilis subscandens var. *palmeri* similis sed pilis foliorum gracilioribus, foliis subtus pilis crassis rigidis in venis munitis, venulisque pilis minoribus debilioribus obsitis, phyllariis exterioribus late lanceolatis 5–8 mm longis, 1.5–2.5 mm latis, apicibus viridibus reflexis 2–5 mm longis.

JALISCO: 3 km E of Mezquitic, hillsides in tropical deciduous forest over igneous rocks, elev. 1700 m, 4 Nov 1963, *Rzedowski 17652* (MICH, type).

In var. *palmeri* the outer phyllaries are 8–14 mm long, their green reflexed or recurved tips 5–12 mm long.

The outer pales in *Viguiera palmeri* in age become thickened and puckered, and because of this Blake transferred the species to a new genus, *Rhysolepis* (Contr. Gray Herb. II. 52: 37. 1917), remarking at the same time that "its general characters and its pappus . . . are essentially those of *Viguiera.*" The inner rows of pales in fact are progressively narrower and less puckered; the innermost are flat and conduplicate as in most other species of *Viguiera.* It does not seem to me that a generic separation can be justified in this case. Similar situations obtain in other well-marked genera of the Heliantheae, as in *Jaegeria,* where the pales may be all thin, or with the outer series thickened, or all indurated and thickened.

Wedelia acapulcensis H.B.K. Nov. Gen. & Sp. 4: 215. 1820. *Wedelia strigosa* Hook. & Arn. Bot. Beech. Voy. 435. 1841. *Aspilia strigosa* (Hook. & Arn.) Hemsl. Biol. Centr. Am. Bot. 2: 171. 1881.

The original specimens of *Wedelia acapulcensis* and *W. strigosa* were without mature achenes, but from their other similarities to mature modern specimens from the type-locality of both species (Acapulco, Guerrero) it is assumed that both represented a population in which the ray-flowers are consistently sterile.

Traditionally *Wedelia* has been circumscribed so as to include species with fertile rays, obtusely angled achenes, and cup-shaped awnless or short-awned pappus. The distinction between *Wedelia* and *Aspilia* (in which the rays are neuter or pistillate but sterile) is not always clear, as even in species with normally fertile rays one may find some or many ray-flowers with undeveloped achenes. The distinction between *Wedelia* and the Sect. *Auchenocarpa* of *Zexmenia* is similarly difficult; normally the ray-achenes are fertile and rather noticeably winged in Sect. *Auchenocarpa*, but in individuals of many species the wings may be greatly reduced, and some or all achenes may be sterile. It seems that one can demonstrate a series leading to partial or total sterility of the ray-flowers, and it appears that *Auchenocarpa* has more in common with *Wedelia* and *Aspilia* than with the other species of *Zexmenia*, in which the achenes are never winged, and the pappus-awns are continuous with the edges of the achenes.

For the purposes of the *Flora Novo-Galiciana*, and pending a revision of the entire group under discussion, I have treated under the name *Wedelia* all the species having the achenes constricted into a short neck bearing the pappus, which is in the form of a toothed or lacerate cup, with or without one or two erect awns. The characters of winged vs. non-winged achenes, and fertile vs. sterile ray-flowers, are thought to be relatively insignificant in this group.

The following key contrasts the newly described *Wedelia cordiformis* and *W. simsioides*, and the other species referred to *Wedelia* in the *Flora Novo-Galiciana:*

1. Heads apparently discoid, sessile in small clusters of 2–5, terminating naked peduncle-like branches; disk-flowers 8–10 in a head. *Aspilia aggregata.*
1. Heads with conspicuous yellow, white, or purple rays, not clustered, individually pedunculate; disk-flowers 20–40 in a head, or much more numerous.
  2. Erect, harshly setose-hispid perennial herbs of marshy meadows, with a few large yellow-flowered heads; disk-flowers more than 100; leaves sessile or with broadly winged petiolar base; rays 13–18, sterile as far as known.
    3. Leaves ovate, sessile, cordate at base, finely denticulate; phyllaries 13–17 mm long, lance-ovate, with tapering tips. *W. cordiformis.*
    3. Leaves broadly ovate, with broad winged margins extending to the base of the petiole, irregularly and somewhat hastately toothed; phyllaries 8–9 mm long, elliptic-ovate, abruptly narrowed to obtuse apiculate tips. *W. simsioides.*
  2. Shrubs, or perennials woody at base, chiefly of upland habitats; disk-flowers 20–60; leaves petiolate, or rarely with petioles margined nearly to base; rays commonly 5–8, fertile or sterile.
    4. Low perennials woody at base, with several sprawling or prostrate stems up to 15–25 cm long; leaves 1.5–4 (–7) cm long, 0.7–1.5 (–2.3) cm wide; heads mostly solitary on peduncles 1–3 cm long; rays sterile as far as known.
      5. Rays white; leaves flat, often obtuse at apex; involucre 8–12 mm high. *W. grayi.*
      5. Rays probably yellow; leaves rugose and revolute-margined, commonly acute at apex; involucre 6–7 mm high. *W. mexicana.*
    4. Erect, woody-based perennial herbs, or shrubs, mostly 0.5–1 m high or more, commonly branched, with several or many long-peduncled heads; leaves commonly more than 5 cm long; rays fertile or sterile.
      6. Leaves mostly elliptic or lanceolate, acute or tapering at base, 3.5–8 times as long as wide, revolute and often appearing entire; rays sterile as far as known.
        7. Rays yellow or occasionally white. *W. rosei.*
        7. Rays purple. *Aspilia xylopoda.*
      6. Leaves mostly ovate, rounded at base and sometimes with winged margins extending below the blade nearly to the base of the petiole; blades mostly 1.5–2.5 times as long as wide, variously toothed; rays sterile or fertile.
        8. Shrub often 1–2 m high; involucre 8–11 (–16) mm high; disk-corollas 5–7 mm long; anthers 2–2.5 mm long; disk-achenes 4.5–5 mm long; rays sterile. *W. acapulcensis.*
        8. Herbaceous perennial woody at base only, often 50–75 cm high; involucre 5–6 mm high; disk-corollas 4 mm long; anthers 1.5 mm long; disk-achenes 2.5–3.5 mm long; rays fertile, the achenes broadly 2-winged. *W. fertilis.*

Aspilia (?) aggregata Greenm. Proc. Am. Acad. 39: 102. 1903.

Nothing like this has been found since the original collection (*Rose 3029!*), which was an over-ripe and incomplete specimen. I suspect it represents an abnormal form of *Wedelia rosei*, which is known from a number of localities in the same general region.

Wedelia cordiformis McVaugh, sp. nov.

Herba perennis grossa erecta, hispido-aspera, metralis, caulibus paucis, basi 5–7 mm crassis, superne pauciramosis, purpureo-maculatis pilisque basi crassis, erectis,

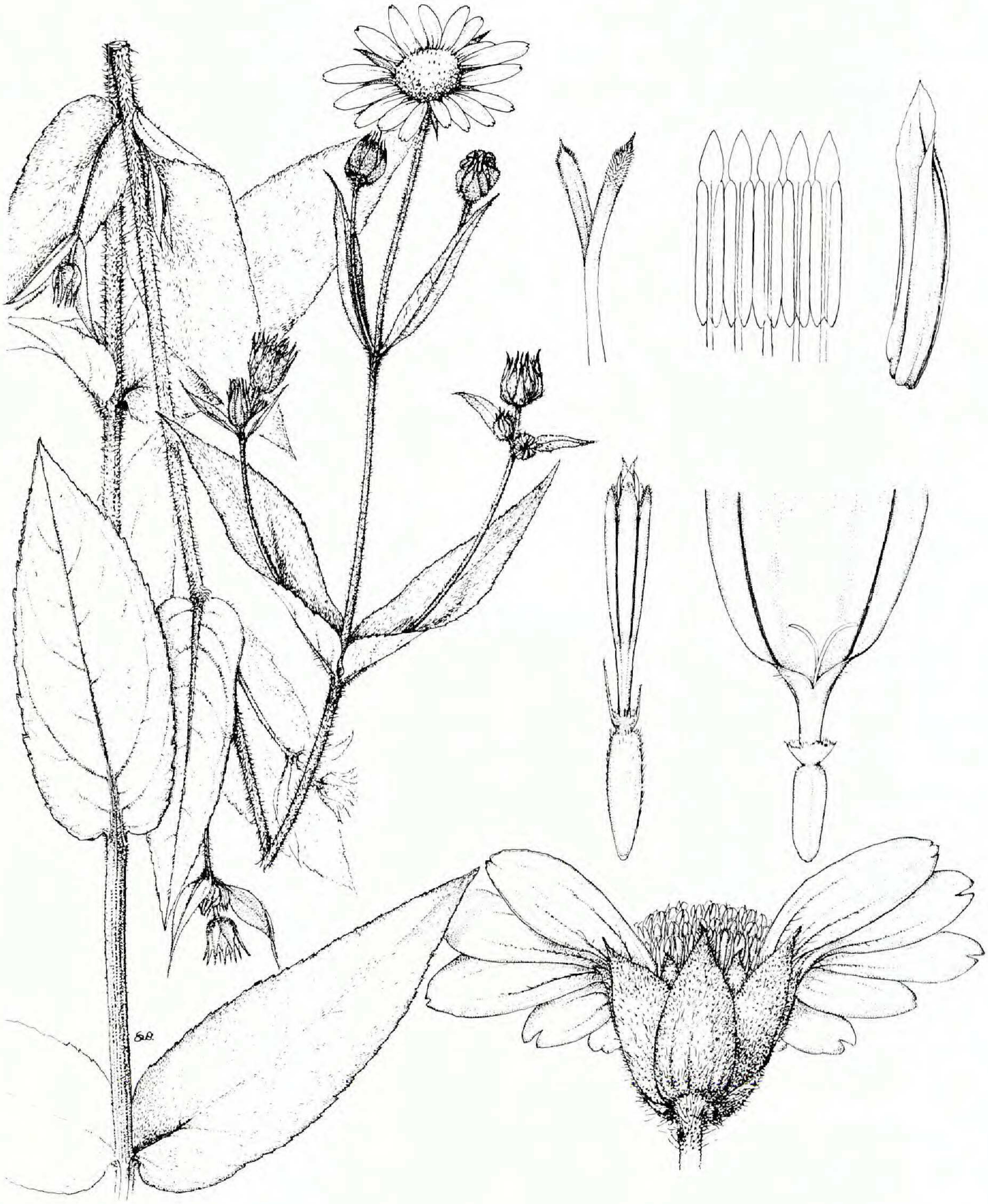

FIG. 49. *Wedelia cordiformis* (*McVaugh 17266,* type). Upper part of a flowering plant, X ½; flowering head with some rays removed, X 1.5; disk-corolla, base of ray-corolla, and immature achenes, X 5; pale, X 5; anthers and style-tips, X 7.5.

attenuatis scabridulis 1–2.5 mm longis grosse hispidis; pili in ramis pedunculisque numerosissimi, cum pilis multo minoribus crispatis glandulosisque immixti; phyllaria pilis plusminusve appressis dense hispida; folia crassa rigidaque, supra pilis rigidis acutis ascendentibus scabra, subtus pilis minutis uncinatis vel capitatis, et in venis pilis crassioribus obsita; laminae sessiles, lanceo-ovatae, 7–10 cm longae (vel superiores breviores), 2–4 cm latae, 2.5–3-plo longiores quam latiores, apice anguste acutae vel acuminatae, basi cordatae auriculis rotundatis, penninerves sed nervis 2 validis medianis ascendentibus, marginibus utroque latere dentibus 20–30 irregulariter non profunde serratis; capitula pauca speciosa 4–5 cm lata (radiis extensis mensa), terminalia, vel ad apices ramorum superiorum ascendentium bina vel terna, pedunculis 5–12 cm longis, 1.5 mm crassis; involucrum hemisphaericum 13–17 mm altum, basi subtruncatum; phyllaria 15–20 subaequalia, exteriorum ca 3 sterilibus ovatis 4–5 mm latis, apicibus acutis attenuatis; phyllaria cetera achaenia subtendentia, eorum 5 vel plusquam 5 foliaceis, late elliptico-ovatis, acuminatis, 4.5–7 mm latis, intima minora membranacea; flores radii feminei 13–17, ut videtur steriles, ligulis flavis oblongis 1.5–2 cm longis, 5 mm latis, apice emarginatis, basi valde binervatis, nervis 2 atropurpureis, tubo 2 mm longo; styli ramuli filiformes 2 mm longi, apice attenuati; flores disci 125–150, corollis flavis inter lobis atrovenosis, vel distaliter purpurascentibus, 7 mm longis, anguste tubuloso-infundibuliformibus, tubo 3 mm longo, lobis acutis triangularibus 0.5–0.7 mm longis hispidulis, intus papillosis; antherae brunneae 2.2 mm longae, basi auriculatae, appendicibus acutis cochlearibus 0.6 mm longis; styli ramuli 1.5 mm longi, intus applanati, extus ad apicibus breve subulatis hirsutuli; achaenia matura non visa, radii glabra, disci pilosa; pappus coroniformis 0.5–1 mm altus scariosus, erosus vel laceratus, ad achaenii apicem collo brevi suffultus, disci achaenii arista adaxiali debili 1–1.3 mm longa munitus; paleae 7–9 mm longae, cymbiformes, carinatae, carina basi purpureo-venosa, apicibus breviacutis.

JALISCO: Poorly drained meadow in grassland, 11–12 km WNW ot Tototlán toward Zapotlanejo, elev. ca 1800 m, beginning to flower 24 Aug 1958, *McVaugh 17266* (MICH, type). Otherwise unknown.

Wedelia fertilis McVaugh, nom. nov. *Lipochaeta strigosa* DC. in DC. Prodr. 5: 610. 1836, not *Wedelia strigosa* Hook. & Arn., 1841. *Zexmenia strigosa* (DC.) Sch. Bip. in Seem. Bot. Voy. Herald 306. 1856.

Habitu characteribusque vegetativis a *Wedelia acapulcensi* vix differt, sed planta herbacea 50–75 cm alta est, non frutex; involucrum 5–6 mm altum (non 8–16 mm ut in *W. acapulcensi*); disci corollae 4 mm longae (non 5–7 mm); antherae 1.5 mm longae (non 2–2.5 mm); achaenia disci 2.5–3.5 mm longa (non 4.5–5 mm); radii fertiles, achaeniis late bialatis.

On the Pacific slope of Mexico from Nayarit to Oaxaca (Tehuantepec, *Andrieux 313*, G-DC!, type), Chiapas and Central America; Yucatán Peninsula.

The full extent of the range of this plant is not known as many specimens lack mature achenes. Specimens from eastern Mexico are often identified as *Wedelia [Zexmenia] hispida* H.B.K., or as *Wedelia parviceps* Blake, a Central American species with very small, about 9-flowered, disk. A revision of the *acapulcensis-fertilis-hispida* complex is much needed.

Wedelia grayi McVaugh, nom. nov. *Aspilia albiflora* A. Gray, Proc. Am. Acad. 22: 425. 1887, not *Wedelia albiflora* Hiern, 1898.

Wedelia mexicana (Sch. Bip.) McVaugh, comb. nov. *Wirtgenia mexicana* Sch. Bip. in Seem. Bot. Voy. Herald 304. 1856. *Aspilia mexicana* (Sch. Bip.) Hemsl. Biol. Centr. Am. Bot. 2: 171. 1881.

Wedelia rosei (Greenm.) McVaugh, comb. nov. *Aspilia rosei* Greenm. Proc. Am. Acad. 40: 39. 1904. *Aspilia angustifolia* A. Gray, Proc. Am. Acad. 22: 425. 1887, not *A. angustifolia* Oliver & Hiern, 1877. *Aspilia angusta* Blake, Contr. U.S. Nat. Herb. 22: 619. 1924.

Wedelia simsioides McVaugh, sp. nov.

Herba perennis (?) grossa erecta aspera metralis, superne sparsim ramosa; caules asperi, pilis basi crassis valde inaequalibus rigidis erectis attenuatis ad 1–1.5 mm longis hispidi, pilis minutis glandulosis immixtis; pedunculi dense hispidi; phyllaria dense brevistrigosa; folia omnia opposita, scabra, rigida, pilis magnis rigidis pilisque parvis uncinatis vel capitatis obsita; laminae sessiles, triplinerves, supra basin petioliformen productam late alatam 1–2 cm longam, 6–15 mm latam, late ovatae vel subhastatae;

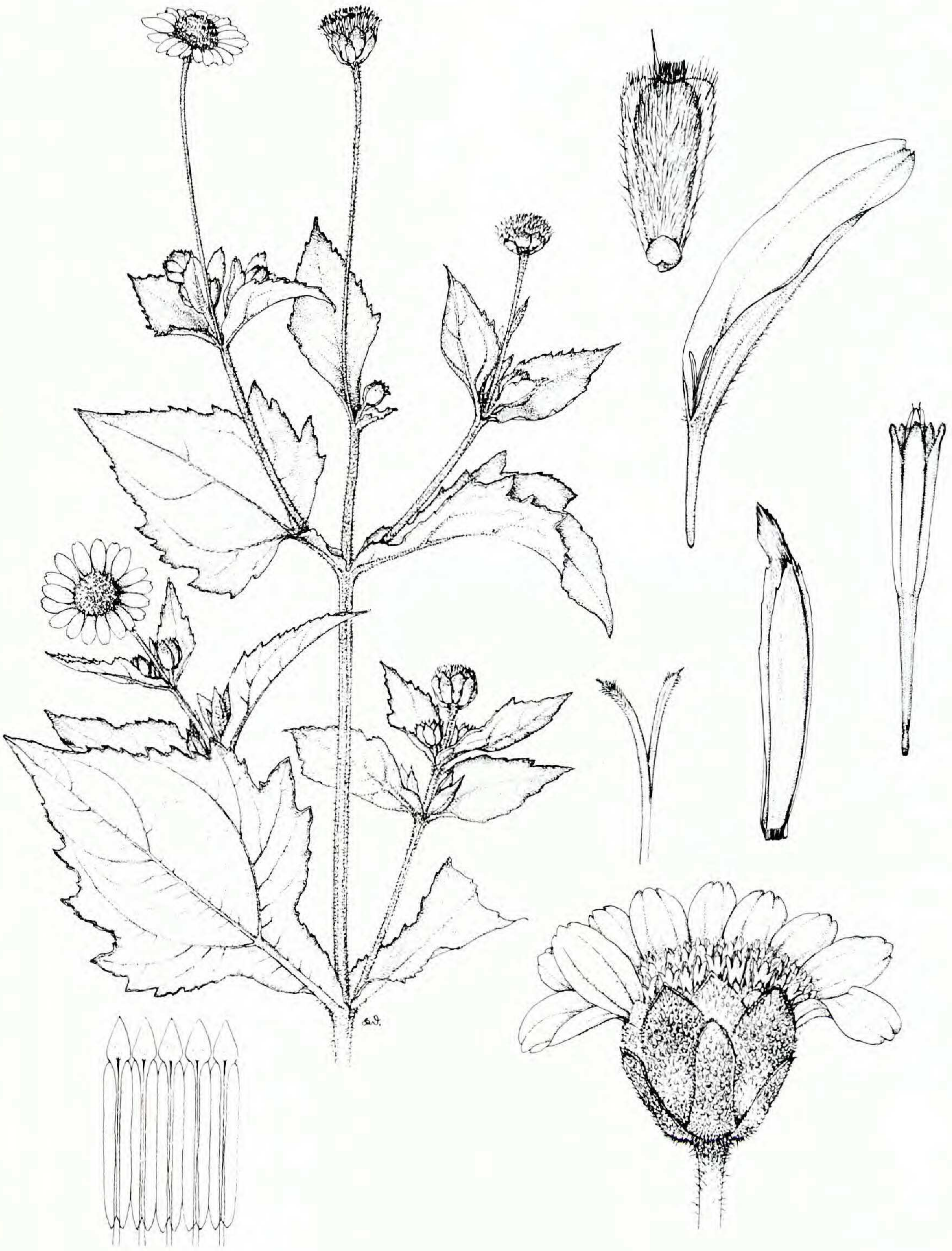

FIG. 50. *Wedelia simsioides* (*McVaugh 18735*, type). Upper part of a flowering plant, X ½; flowering head with some rays removed, X 2; corollas, disk-achene, and pale, X 5; anthers and style-tips X 5.

laminae pars ovata 3–8 cm longa, 2–7.5 cm lata, acute acuminata, versus basin rotundata, marginibus grosse, irregulariter, acuteque dentatis, vel dentibus proximalibus majoribus prominentibus; capitula crassa, brevia, ca 2.5 cm lata (radiis extensis mensa), terminalia vel ad apicibus ramorum paucorum superiorum ascendentium bina vel terna, pedunculis (2–) 5–15 cm longis, 1–1.5 mm crassis suffulta; involucrum hemisphaericum 8–9 mm longum; phyllaria appressa 20–22, rigida, foliacea vel intimorum 5–8 membranacea, mediana exterioraque elliptico-obovata, 2.5–4.5 mm lata (extima angustiora), ad apices obtusos apiculatos abrupte angustata; flores radii 15–18, feminei, steriles, ligulis aureis basi atrovenosis, ellipticis, 8–10 mm longis, 3–4.5 mm latis, tubo 3.5 mm longo; styli ramuli filiformes 2.5 mm longi, apicibus attenuatis; ovarium sterile lineare 3 mm longum, pappo ex squamellis laceratis aristisque 3 debilibus minus quam 1 mm longis constanti; flores disci conferti ca 150; corollae aureae 8 mm longae, anguste tubuliformes, inter lobos lineatae, lineis atropurpureis, tubo gracili 4 mm longo, lobis pallidis triangularibus 1 mm longis intus papillosis; antherae brunneae 2.8 mm longae, basi auriculatae, appendicibus coriaceis ovatis cochlearibus 0.7–0.8 mm longis; styli ramuli filiformes, intus applanati, extus et in appendice subulato hirsutuli; achaenia disci 3.5–4 mm longa, ambitu cuneata vel obovata, pilis cupreis sericeo-strigosa, anguste marginata sed vix alata, apice sub-biauriculata, auriculis truncatis; pappus cyathiformis sessilis (collo obsoleto) 0.7–0.8 mm alto minute laciniatus, aristis 2 debilibus inaequalibus, arista longiore 1 mm longa; paleae scariosae 7–8.5 mm longae, ante postque anthesin involucrum superantes, anguste carinatae (carina basi purpureo-nervata), apicibus planis acutis erosis 2 mm longis, rigidis, lanceolato-ovatis saepe purpureis; receptaculum fere planum 5 mm latum.

NAYARIT: Marshy meadows among hills in oak zone 6–8 km N of Compostela, elev. 800–900 m, 5 Sep 1960, *McVaugh 18735* (MICH, type). Otherwise unknown.

Aspilia xylopoda Greenm. Proc. Am. Acad. 40: 40. 1904.

Known only from extreme southern Durango (*Rose 2260!*, lectotype) and adjacent Nayarit, at elevations between 2000 and 2500 m. This may be merely a purple-flowered form of *Wedelia rosei.* Apparently the purple- and yellow-flowered plants are associated in nature, as Rose's no. 2245 includes both. Field-studies in the rather inaccessible region where Jalisco, Nayarit, Durango and Zacatecas adjoin are needed to clarify the status of *A. xylopoda.*

Zaluzania augusta (Lag.) Sch. Bip., var. **rzedowskii** McVaugh, var. nov.

Frutex 1–2-metralis, var. *augustae* similis sed pubescentia et globulis resinosis amplius praeditus, et characteribus aliis differt:

Folia utrinque griseo-veneta, supra vix viridiora; phyllaria herbacea pilis brevibus (foliorum pilis similibus) dense cinereo-pubescentia; paleae prope apices dense pubescentes et globulis resinosis instructae; corollae lobi antherarum appendicesque resinoso-globuliferi; folia ramorum florentium saepe obovata vel spathulata, superiora manifeste minora, corymbis versus apices fere aphyllis, ramulisque ultimis interdum ebracteatis; pedunculi 1–3 cm longi; ligulae pubescentes; flores disci 60–90, tubo corollae laxe piloso, glandulari; achaenia radii ad 2 mm longa distaliter pilosa, pappo nullo vel ex setis paucis brevibus constanti; paleae 3.5–4 mm longae, brevi-acutae, dorso et ad apicibus pilosae.

ZACATECAS: Rocky oak-covered hills ca 25 km E of Huejuquilla el Alto, near the road between Valparaíso, Zac., and Mezquitic, Jal., elev. ca 2000–2100 m, 4–5 Sep 1958, *McVaugh 17673* (MICH, type); 12 Sep 1966, *Anderson & Laskowski 3623.*

JALISCO: Arroyos del Agua, 10 km NW of Huejuquilla, 1500–1550 m, 2 Nov 1963, *Rzedowski 17629, Feddema 2377.*

In typical *Zaluzania augusta,* which is known to range from near the City of Aguascalientes to Hidalgo, the pales are glutinous but not strongly pubescent, and the pappus in the ray-flowers (at least in Nueva Galicia) usually consists of short, irregular, somewhat united subulate setae 0.6–0.8 mm long, or of 3 awnlike scales and intervening setae. In var. *rzedowskii* the pappus is pretty consistently wanting.

Zexmenia helianthoides (DC.) A. Gray, var. **jaliscana** McVaugh, var. nov.

Folia supra modice aspera (non scabra ut in var. *helianthoide*), e loco supra basin 5–10 mm 3-nervata (non e basi 3-nervata); ramulorum inflorescentiaeque pili pallidi plusminusve appressi (rami non sordide hirsuti).

JALISCO: In oak woodlands below the pass, 16–20 km SW of Autlán, elev. 1000–1500 m, 1 Nov 1962, *Cronquist 9778* (MICH, type), 21 Nov 1959, *McVaugh & Koelz 872;* in deciduous forest ca 30 km SW of Autlán, elev. 300 m, 8 Apr 1949, *McVaugh 10197;* Tecalitlán, Sierra del Halo, in pine forest, elev. 2000–2200 m, 28–30 Nov 1959, *McVaugh & Koelz 1207;* Sierra de los Corales, ca 15 km E of Pihuamo, elev. 1200–1300 m, 24 Oct 1963, *Feddema 2213.*

Typical *Zexmenia helianthoides* in a plant chiefly of the hills bordering the Balsas valley, ranging from western Michoacán to Morelos and Guerrero. The type (*Karvinski s.n.* in herb. G-DC!) came from between Sultepec and Mina de Cristo, Edo. de Mexico.

The group of *Zexmenia* that includes this species and *Z. michoacana* Blake is a difficult one taxonomically, and is in need of revision. In *Z. michoacana* the involucre is about 7–10 mm long as against 11–17 mm in *Z. helianthoides,* and the disk flowers are about 40–50 (–75?) in a head, as against 75–100 (–200?).

Zinnia angustifolia H.B.K., var. **greggii** (Rob. & Greenm.) McVaugh, comb. nov. *Zinnia greggii* Rob. & Greenm. Proc. Am. Acad. 32: 16. 1896.

Traditionally *Zinnia angustifolia* has been described as an annual with orange rays, and *Z. greggii* as a perennial with white or yellow rays. In Nueva Galicia there appear to be two populations that are geographically overlapping, both perennial (but often flowering the first year and appearing annual), morphologically indistinguishable except for the color of the rays. Var. *angustifolia,* with bright orange rays, is the more widely distributed (southern Sonora to Jalisco, Michoacán, Aguascalientes and San Luis Potosí), but is replaced to some extent, on the Pacific Slope from Sinaloa to Michoacán, by the var. *greggii* with white or cream-colored rays that may be distinctly yellow when dry. Plants with white rays and those with orange rays are sometimes found growing together.

Tribe V. Inuleae

Gnaphalium attenuatum DC., var. **sylvicola** McVaugh, var. nov.

Folia 5–10(–15) cm longa, (3–) 5 (–8) mm lata, (10–) 15–20-plo longiora quam latiora, supra laevia lucidaque, viridia et fere glabra sed pilis gracillimis arachnoideis paucis plerumque persistentibus; capitula pallide rosea, vetustiora saepe straminea vel pallide brunnea; phyllaria interiora 12–13; flores hermaphroditi 3–7, corollis 3 mm longis vel brevioribus; a var. *attenuata* foliis angustioribus supra non asperatis, capitulis roseis non albo-flavidis nec albo-brunneis, phyllariis 12–13 non 13–21, differt.

DURANGO: Between Durango and Mazatlán, humid oak-pine forest near the Sinaloa border, elev. 2100–2300 m, 23 Mar 1951, *McVaugh 11581.*

JALISCO: Cerro de Tequila, pine forest, elev. 1700 m, 23 Dec 1967, *L. M. Villarreal de Puga 1088;* San Sebastián, elev. 1425 m, 3 Jan 1927, *Mexia 1359;* Sierra de Cuale, SW of Talpa de Allende, elev. 1800–2250 m, 19–21 Nov 1952, *McVaugh 14283* (MICH, type); 25–30 km SE of Autlán, near summits between El Chante and Cuzalapa, elev. 2000–2250 m, 19–22 Mar 1965, *McVaugh 23105;* Sierra del Tigre, S of Mazamitla, pine forest, 2100–2200 m, 10 Nov 1959, *McVaugh & Koelz 445.*

MEXICO: Valle de Bravo, 28 Jan 1943, *Dodds & Simpson 34;* Sultepec, 27 Oct 1935, *Hinton 8390.*

MORELOS: Sierra de Tepoxtlán, 7500 ft, 13 Feb 1907, *Pringle 13885.*

GUERRERO: Dist. Mina, Petlacala, 1850 m, 15 Dec 1937, *Mexia 8962;* Chiriagua, 1340 m, 18 Nov 1936, *Hinton 9845.*

The var. *attenuatum* appears to occupy much the same range as that of var. *sylvicola,* but it is found in somewhat drier habitats. Both are unusual for the genus in being forest plants, not especially weedy but occupying clearings or open places in oak-pine or pine-fir forest.

The var. *sylvicola* in appearance suggests an intermediate between *G. attenuatum* var. *attenuatum,* in which the leaves are 4–8 (–15) mm wide, and *G. greenmanii* Blake, in which the leaves are 2–3 mm wide and 30–50 times as long as wide.

Gnaphalium semilanatum (DC.) McVaugh, comb. nov. *Gnaphalium oxyphyllum β semilanatum* DC. in DC. Prodr. 6: 225. 1838.

The type-material of *Gnaphalium oxyphyllum* DC. (G-DC!) consists of several specimens collected by Méndez near Villalpando, Guanajuato. The plants are somewhat woollier than our material from Nueva Galicia, but are also very glandular and appear to represent the same species that I have called *oxyphyllum.* In most specimens from Jalisco and Aguascalientes the leaves are green and nearly hairless on both sides or thinly woolly beneath when young, and the middle and lower stems are glandular-pilose. In *G. semilanatum* the leaves are strongly bicolored, white beneath with a feltlike tomentum; the stem is similarly tomentose, not glandular. Most of the species of *Gnaphalium* are either strictly glandular or non-glandular, and I have accordingly separated these two rather similar plants, pending further investigation of their relationships.

Gnaphalium vulcanicum I.M. Johnst., var. **monticola** McVaugh, var. nov.

Annua vel biennis saepe 0.5–1 m alta vel altior; folia ad 50–75, caulinia plerumque angusta, attenuata; caules foliaque plerumque manifeste glandulosa; capitula 4.5–7 mm longa, 60–80-flora, brunnea vel flavo-brunnea; habitat silvas montanas, alt. 2500–3500 m.s.m.

JALISCO: Cerro de Tequila, in oak forest, elev. 2400–2800 m, 14 Sep 1967, *McVaugh 23922, 23923;* Nevado de Colima, SE slopes in fir forest, elev. 2850 m, 2 Apr 1951, *McVaugh 11706;* 25–30 km SE of Autlán, pine forests near summits between El Chante and Cuzalapa, elev. 2750 m, 20–21 Mar 1965, *McVaugh 23126* (MICH, type).

MICHOACAN: NW of Ciudad Hidalgo, mountains W of Cerro San Andrés, pine-fir forests, elev. 2850–3000 m, 21 Mar 1949, *McVaugh 9985.*

GUERRERO: Mpio. de Tlacotepec, Cerro Teotepec, pine-fir forest, elev. 2900 m, 29 Jan 1965, *Rzedowski & McVaugh 240.*

MORELOS: Tres Marías Mts., 9500 ft., 7 Nov 1903, *Pringle 11531.*

GUATEMALA: Chimaltenango, Santa Elena, 2400–2700 m, 22 Jan 1933, *Skutch 191.* Quezaltenango, 2 km W of Quezaltenango, 3 July 1960, *King 3187.*

The var. *vulcanicum* is a plant of open places near timberline and above, at elevations from 3000 to 4000 m; the flowering stems are usually 30 cm high or less, the cauline leaves mostly 20 or fewer, merely acute, the stems and leaves woolly but seldom manifestly glandular; the heads are 6.5–8 mm long, the flowers 125–200 in a head. Plants of var. *monticola* have somewhat the aspect of *Gnaphalium oxyphyllum* DC., but in that species the heads are white and only 35–50-flowered, 4–4.5 mm long, the perfect flowers 2–7 (not 10–20).

Tribe VI. Mutisieae

Perezia glomeriflora (A. Gray) McVaugh, comb. nov. *Gochnatia glomeriflora* A. Gray, Proc. Am. Acad. 19: 57. 1883. *Perezia capitata* S. Wats. Proc. Am. Acad. 25: 156. 1890. *?Perezia collina* S. Wats. Proc. Am. Acad. 26: 144. 1891.

This plant seems obviously closely related to several other species of *Perezia* from the same region (e.g. *P. dugesii* A. Gray, *P. simulata* Blake), but not particularly closely to the other Mexican species of *Gochnatia,* to which genus it has been assigned because most of the corollas are equally 5-lobed, not with one broad lobe and 2 narrow ones as usual in *Perezia.* In fact the corollas in *P. glomeriflora* are not always 5-lobed; sometimes they are typically perezioid (with one broad and 2 narrow lobes), or occasionally they may have one narrow lobe and 2 broad ones. Union and non-union of corolla-segments are under relatively simple genetic control in many plant genera, and it seems likely that they are here also. Curiously enough, although *P. glomeriflora* was excluded from *Perezia* in Bacigalupi's revision of the genus, the very similar *P. collina* was admitted as a true *Perezia* with an "anomalous" corolla.

Perezia hooveri McVaugh, sp. nov.

Herba perennis 1–1.5-metralis, erecta, foliosa, subglabra, caulibus purpureis ad 6 mm crassis vel crassioribus, laevibus glabrisque vel pilis paucis instructis, ramis pedunculisque in axillis foliorum bractearumque barbatis, ceterum glabris; folia pro

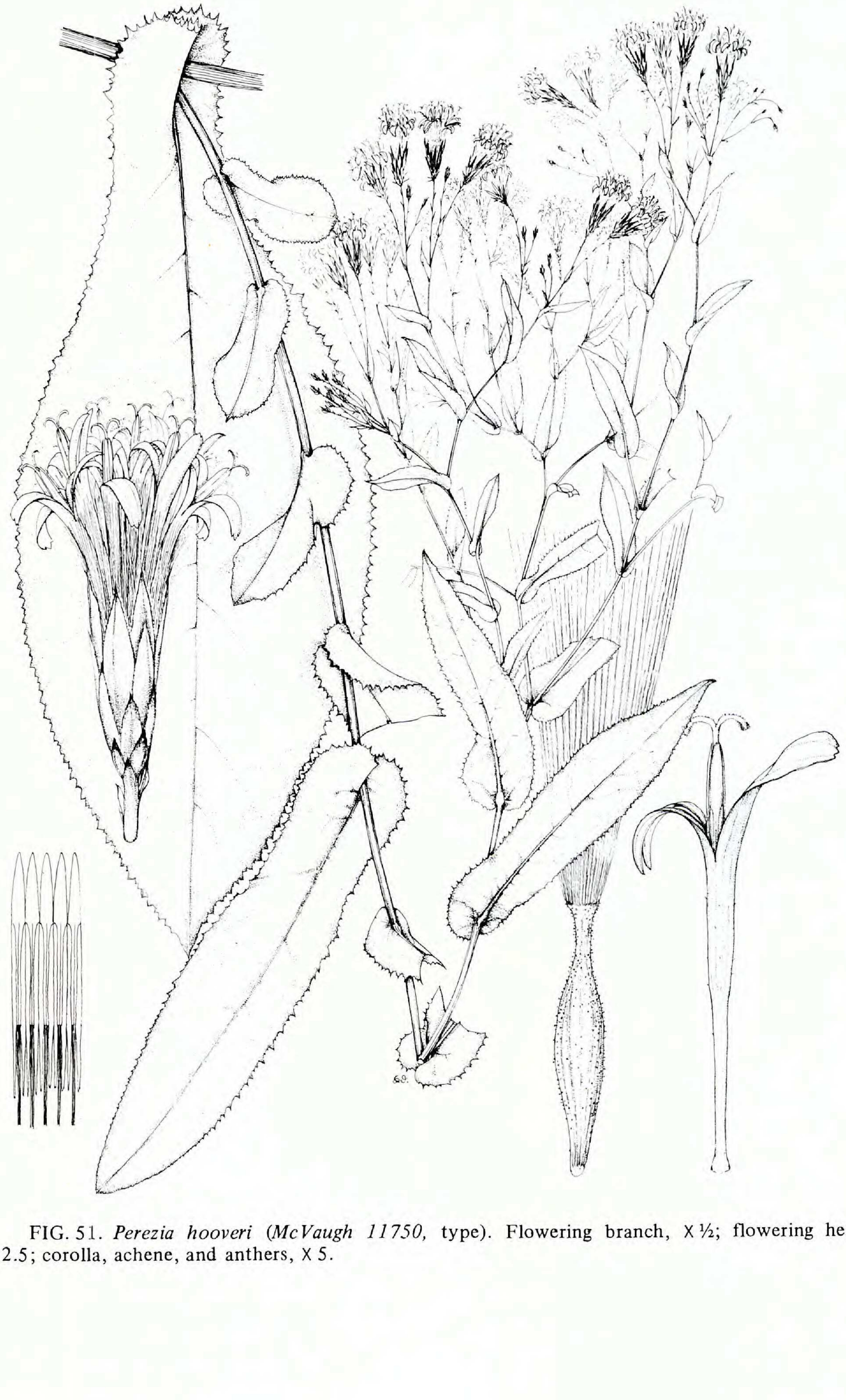

FIG. 51. *Perezia hooveri* (*McVaugh 11750,* type). Flowering branch, X ½; flowering head X 2.5; corolla, achene, and anthers, X 5.

genere tenuia et inconspicue venosa, supra asperula, marginibus scabris, subtus pilis parvis paucis in venis exceptis glabra; phyllaria pedunculique bracteae pauciciliatae, non glandulosae; folia principalia caulinia elliptico-obovata, sessilia amplexicauliaque, 20–30 cm longa, 6–12 cm lata, ca 2.2–3-plo longiora quam latiora, e medio ad apicem acutum vel breviacuminatum et ad basin oblongam 3–4.5 cm latam angustata, auriculis basalibus rotundatis 1–1.5 cm longis, marginibus grosse dupliciterque dentibus acutis 1–3 mm altis munitis; ramorum florentium majorum folia multo minora, angustiora, oblongo-elliptica vel superiora ovata, (4–) 8–15 cm longa, 2–4 cm lata, basi amplectentia, apicibus angustis acutis exceptis spinuloso-denticulata; inflorescentiae ramulorum bracteae foliaceae, ovato-cordatae, 1–4 cm longae, integrae vel vix denticulatae; caulis ut videtur inferne simplex, parte superiore diffuse ramosa, ramis majoribus divaricatis 30–60 cm longis, 5–6-plo furcatis, capitulis ca 2 cm longis, angustis plurimis, in pedunculis filiformibus subulato-bracteatis 1–2.5 cm longis suffultis; involucrum 10–12 mm longum, anguste campanulatum vel obconicum, phyllariis ca 20, purpurascentibus, vix basi excepta imbricatis, medianis exterioribusque gradatim brevioribus, ellipticis, acutis, ad 1.5 mm latis, extimis brevissimis laxe patentibus; phyllaria intima 5 plerumque manifeste longiora 9–11 mm longa, angusta elliptica vel sublinearia, 1–1.3 mm lata, tenuia vix coriacea, ad apices acutissimos obscureque mucronatos attenuata; capitula 11-flora; corollae roseae vel purpurascentes, 11.5–12.5 mm longae, tubo obscure glanduloso-puberulenti, lobo exteriore 4.5 mm longo, 1.5 mm lato, lobis interioribus 0.4 mm latis, interdum connatis; antherae apicibus sterilibus purpurascentibus inclusis 4–4.5 mm longae, appendicibus incurvatis, caudis 1.8–2.5 mm longis; styli ramuli 1.5 mm longi applanati, papillosi, apicibus spathulatis, truncatis; achaenia viridi-brunnea ca 7 mm longa, compresso-fusiformia, ad rostrum brevem attenuata, prope medium 1.2 mm lata, paucinervia, copiose glandulosa; pappi setae biseriatae 9–12 mm longae, alboflavidae, rigidiusculae sed gracillissimae; receptaculum glabrum, alveolatum, alveolarum marginibus dentatis.

Species comiti adjutorique David Beall Hoover (1926–), nunc washingtonensi, qui mecum anno 1951 per terram mexicanam lustravit et plantas collectavit, nominavi.

JALISCO: Nevado de Colima, SE slopes in pine-oak-fir forest, elev. 2400 m, 3 Apr 1951, *McVaugh 11750* (MICH, type); SE of Autlán, barranca-forest above Ahuacapán, elev. 1500–2200 m, 22–23 Nov 1959, *McVaugh & Koelz 1011*.

Superficially like *Perezia patens* A. Gray, but in the latter the main flowering branches have a strong central axis, whereas in *P. hooveri* they are repeatedly forked. In *P. patens* the phyllaries are 25–35, overlapping in several series, and the middle ones are 2–2.5 mm wide, broadly elliptic to ovate or obovate, rounded or abruptly acuminate.

Tribe VII. Senecioneae

Liabum simile McVaugh, sp. nov.

Frutex arcuatus gracilis 3–4 m altus, ramis longis subscandentibus, caule striato, initio floccoso-tomentoso; inflorescentiae rami, pedunculi phyllariaque pilis gracilibus arachnoideis pilisque glanduliferis immixtis obsita, pilis glandulosis majoribus ex parte apicibus ampliatis cylindricis instructis; folia deltoideo-hastata, 6–13 cm longa lataque, supra glabrescentia sed scabridula, subtus venis principalibus exceptis perpetuo albotomentosa; laminae acutae vel breve acuminatae, basi late obtusae vel truncatae, majores saltem hastatae lobis acutis, marginibus sinuatis et cuspidato-denticulatis, in petiolos 3–7 cm longos cuneatim decurrentibus; inflorescentia terminalis ad 15 cm longa lataque vel longior latiorque, paniculiformis, ramis lateralibus ca 2-plo ramosis, 10–15-cephalis, infimis exceptis per bracteas oblanceolatas coriaceas 1–2 cm longas subtentis; capitula discoidea; involucrum 8–9 mm longum, late campanulatum vel hemisphaericum; phyllaria 25–30, pilis glandulosis pilisque gracilibus eglandulosis dense pubescentia, apicibus tomentulosa, exteriora manifeste gradatimque breviora; phyllaria interiora lanceolata, acuta, 1.3–2.5 mm lata; exteriora (extimis exceptis) similia sed ovata, acuta, basi striata, demum plusminusve squarrosa; flores 15–19; corollae albae, ca 10 mm longae, tubo breve 2 mm longo, in faucem anguste infundibuliformen sensim ampliato, lobis lanceolatis, 2.5 mm longis, sub anthesi recurvatis; antherae flavidae 3.5 mm longae; styli flavi vel aurantiaci, ramulis 1 mm longis; achaenia columnaria vel distaliter paullo ampliata, 3.5–4 mm longa, striata, pallide griseo-brunnea, plusminusve

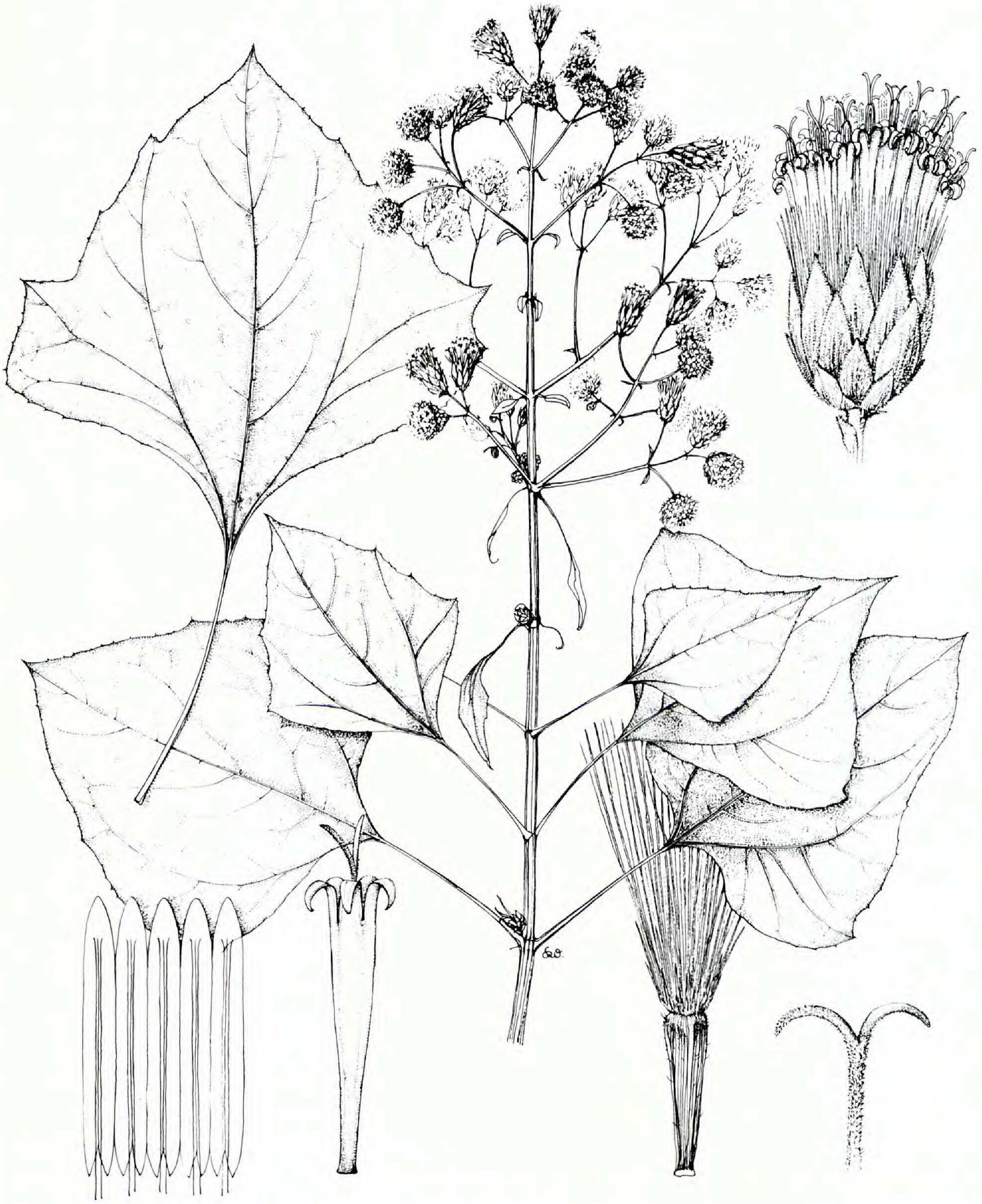

FIG. 52. *Liabum simile* (*Cronquist 9602*, type). Flowering branch and detached cauline leaf, X ½; flowering head, X 2.5; corolla, X 3.5; achene, X 5; style-tips, X 7.5; anthers, X 10.

breve pilosa et rare glanduloso-globulifera; pappi setae albo-flavidae 7 mm longae, squamellis 0.5–1 mm longis; receptaculum alveolatum, alveolarum marginibus hirsutulis.

NAYARIT: Depressions in lava flow, in shade of *Bursera* and other trees, ca 10 km NW of Ahuacatlán, elev. ca 1000 m, 4 Oct 1962, *Cronquist 9602* (MICH, type).

JALISCO: Tropical subdeciduous forest along Río Cuale, 3 km SE of Puerto Vallarta, elev. 50 m, 12 Nov 1963, *Feddema 2507.*

Superficially *Liabum simile* is much like *L. caducifolium* Rob. & Bartl., which is widespread near the Pacific coast from southern Jalisco to Guerrero, but in *L. caducifolium* the phyllaries are only 15–20, 5–6 mm long, the flowers are only 6–9 (–12) in a head, and the herbage lacks most of the pubescence characteristic of *L. simile,* including the coarse glandular hairs of the phyllaries and peduncles.

Pippenalia McVaugh, gen. nov.

Herba scaposa perennis, basi lanosa, scapis erectis 1–3, sulcatis, monocephalis, foliisque erectis longipetiolatis, peltatis, radiatim profunde lobatis; flores aurei; capitula multiflora, heterogama, vix vel haud calyculata; involucrum sub-biseriatum, phyllariis subaequalibus, linearibus vel lanceolatis, rotatis; receptaculum nudum; flores radii feminei, fertiles, ligulis conspicuis, tubo breve; flores disci plurimi, hermaphroditi, tubo quam fauce cylindrica multo breviore, lobis 5 ovatis, fauce dimidio brevioribus; antherae cum filamentis ca aequilongae, basi obtusae, apice appendicibus scariosis instructae; florum disci styli ramuli lineares, intus applanati, extus rotundati pubescentesque infra apices penicillati, apicibus obtusis nudis; achaenia late fusiformia vel obovoidea, glabra, 15–20-costata; pappus nullus.

Genus in honorem amici Richard Wayne Pippen (1935–), cui debetur "Mexican 'Cacalioid' genera allied to *Senecio* (Compositae)," dicavi.

Type: **Pippenalia delphinifolia** (Rydb.) McVaugh, comb. nov. *Odontotrichum delphinifolium* Rydb. Bull. Torrey Bot. Club 51: 419. 1924.

Montane oak or oak-pine forests, on rhyolites or other volcanic rocks, from Chihuahua to southern Zacatecas (*Rose 2390!* the type), Aguascalientes and northern Jalisco, at elevations of 2450 to 2700 m, flowering from July to September.

The type of *Odontotrichum delphinifolium* was in fruit only. Flowering material was first discovered on the Sierra del Laurel, near the border between Aguascalientes and Jalisco, in 1960. The large yellow heads, with long rays resembling those of a sunflower, seem to preclude the possibility that the plant belongs with any of the white-flowered senecioid genera, including *Odontotrichum.* The correct taxonomic position of the genus is still open to question. In habit the plants are very like those of what Pippen has called the "cacalioid" members of the Senecioneae; the styles are at least not unlike the senecioid type; the plump naked achenes suggest those of some members of the Heliantheae, but are unusual if not unique among the North American Senecioneae.

Senecio filaris McVaugh, sp. nov.

Arborescens 2-metralis, trunco ad 5 cm diametro, ramis crassis fragilibus medulla lamellata; foliorum cicatrices lunatae vel hippocrepiformes 5 mm latae, pallidae, erosae; planta fere glabra, foliis subtus ut videtur rare tomentosis, inflorescentiae basi bracteisque arachnoideis; folia (2 delapsa visa) ad apicibus ramorum fasciculata, longe petiolata, ca 8 cm longa, 12 cm lata, palmatim 5–7-lobata, lobis acutis triangularibus 2–3 cm altis, marginibus integris, basi non profunde cordata; inflorescentia post lapsum foliorum evoluta, terminalis, umbelliformi-corymbosa, 8–15 cm alta lataque, ramis valde ascendentibus 10–15 gracilibus simplicibus 2.5–12 cm longis, 0.5–1 mm crassis (terminalibus saepe manifeste crassioribus), quoque ramo capitula solitaria terminali (raro capitulis 2), bractea lineari sub-basali 1 cm longa vel breviore, et supra basin

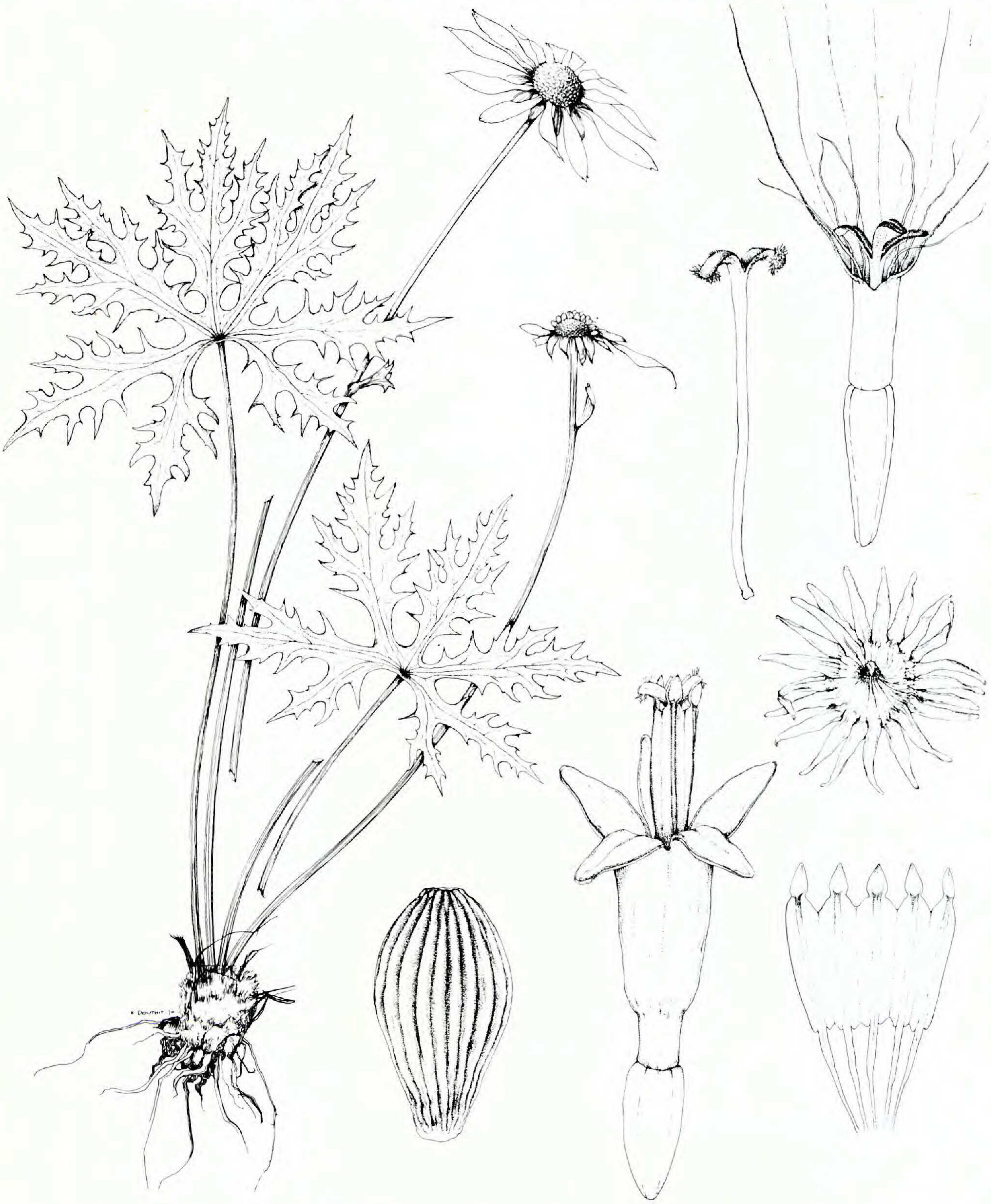

FIG. 53. *Pippenalia delphinifolia* (*McVaugh 18427*). Flowering plant, X 1/3; involucre from below, ca X 1; achene, X 5; disk-flower, base of 3-styled ray-flower, anthers, and style-tips, all X 6-2/3.

bracteis 1–3 minoribus, instructo; capitula aurea 1.5–2 cm alta, conspicue radiata; involucrum 12–13 mm longum, basi subtruncatum, bracteis accessoriis ca 3–5 filiformibus laxe patentibus subtentum; phyllaria ca 20 longitudine subaequalia, linearia vel distaliter paullo ampliata, apicibus acutis fimbriata, basi in siccitate gibba, exteriora 1.2–1.5 mm lata, interiora 2–2.5 mm lata, marginibus latis tenuibus; flores radii 13–14, ligulis 16–19 mm longis, 3–4 mm latis; flores disci ca 50–55, corolla 11 mm longa, angustissime infundibuliformi, tubo vix manifesto 2.5 mm longo basi campanulato, lobis ca 1 mm longis; antherae 4 mm longae; styli ramuli ca 2 mm longi,

apicibus ampliati hispidique; achaenia glabra, 4–6 mm longa vel longiora (matura non visa); receptaculum glabrum alveolatum.

COLIMA: Mountains in area of gypsum and slate, 17–18 km SSW of Colima, deciduous forest with *Bursera, Amphipterygium, Cyrtocarpa, Cephalocereus,* elev. 400–500 m, 7 Dec 1959, *McVaugh & Koelz 1550* (MICH, type). Otherwise unknown.

Evidently related to *Senecio praecox* (Cav.) DC., which appears to be unknown from Colima and southern Jalisco, and also to *Senecio bombycopholis* Bullock. From *S. praecox, S. filaris* differs in the much larger heads (50 or more disk-flowers as against 20 or fewer), which are solitary on long slender branches rather than corymbosely cymose and short-peduncled. From *S. bombycopholis, S. filaris* differs in the smaller heads, smaller and fewer flowers, narrower and shorter phyllaries, and more slender peduncles.

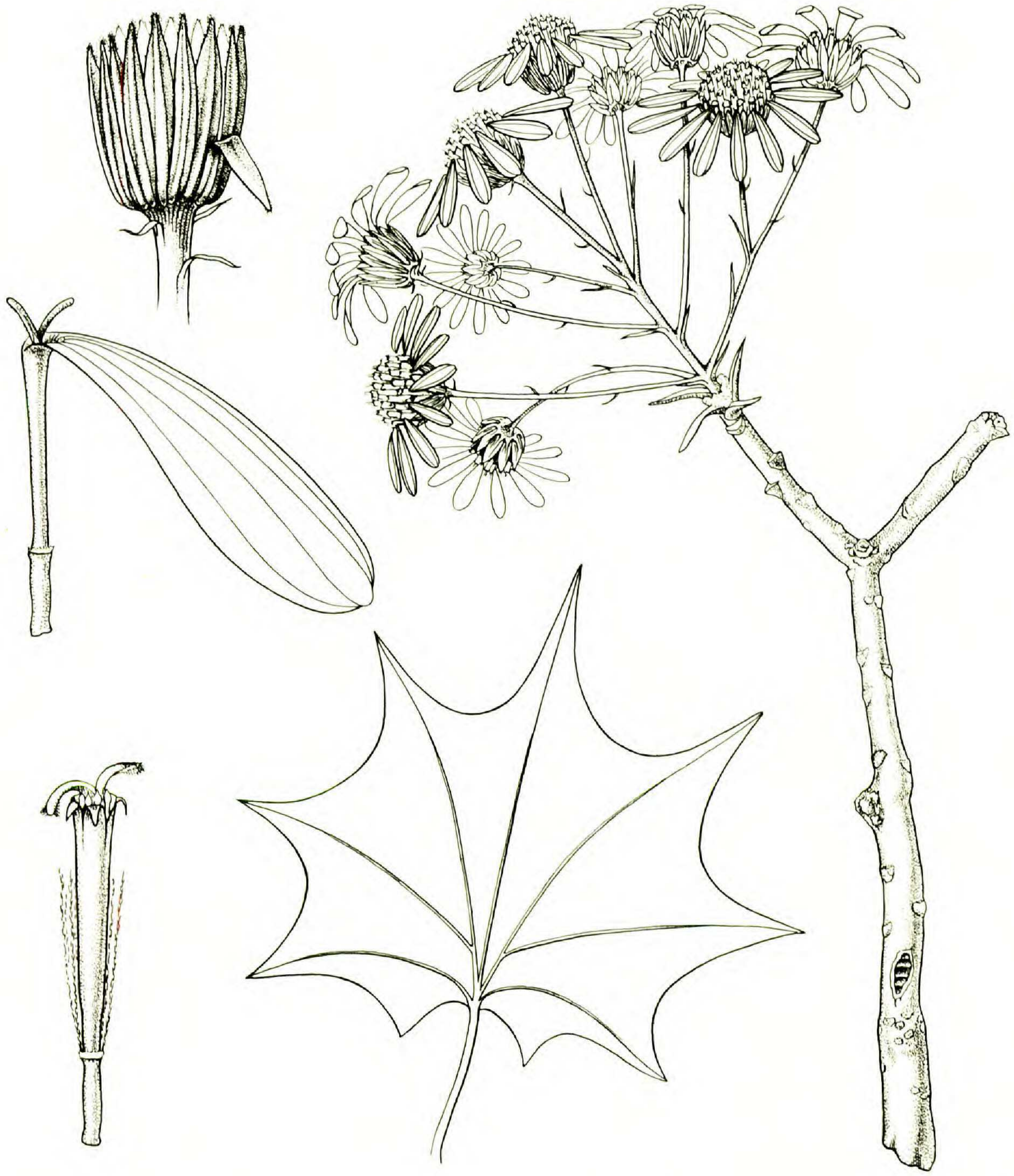

FIG. 54. *Senecio filaris* (*McVaugh & Koelz 1550,* type). Flowering branch and detached leaf, ca X ½; involucre, ca X 1.5; flowers, ca X 3. Drawn by Jeanne C. Koelling.

Senecio galicianus McVaugh, sp. nov.

Herba perennis gigantea 2–4-metralis, caulibus fistulosis foliosis, solitariis vel paucis, e caudicibus brevissimis lignosis oriundis, rare pubescens, inflorescentia arachnoideo-tomentulosa et pilis brevibus glanduliferis plerumque instructa, foliis glabrescentibus sed praecipue subtus in venis per bases pilorum multicellularium persistentes paullo asperatis; folia palmatim valde lobata, ambitu ovata vel late oblonga vel suborbiculata, principalia usque ad 30–35 cm longa lataque (sub inflorescentiam saepe 18–25 cm longa), lobis ca 9 acutis, deltoideis vel ovatis, stellatim dispositis vel ascendentibus 3–8 cm altis (vel loborum pari infimo 1–2 cm alto); laminae plerumque late sed non profunde cordatae, marginibus calloso-denticulatis (vel foliorum majorum dentibus acutis angustis ad 5 mm longis vel longioribus sublaceratis), petiolis 12–20 cm longis suffultae, venis subpalmatim dispositis; venarum paria 3–5 prope laminae basin oriunda, venis ad 5–10 mm distantibus; inflorescentia terminalis 30–100 cm longa, paniculiformis, ramis compositis plurimis ad 30–50 cm longis; rami inferiores foliis deminutis 10–20 cm longis subtenti, superiores bracteis foliaceis subsessilibus; capitula plurima, parva, 7–9 mm longa, radiata, flava vel aurea, 3–4 mm crassa, 10–30 prope ramorum apices in fasciculis umbelliformibus conferta, pedunculis bracteatis 5–10 mm longis, bracteis filiformibus; involucrum campanulatum, calyculo appresso subtentum, bracteis accessoriis lineari-subulatis ca 5–8, brevissimis vel longioribus ad 4.5 mm longis; phyllaria 10–13 subaequalia 3.5–5 mm longa, apicibus pubescentibus exceptis glabra, exteriora acuta linearia 0.4–0.6 mm lata, interiora tenuimarginata ad 1.5 mm lata; flores radii 5–8, ligulis 3.5–4.5 mm longis, 1.5–2 mm latis; flores disci 9–12, corollis 6 mm longis, tubo 2 mm longo, lobis triangularibus 1 mm longis; antherae appendicibus inclusis 2–2.3 mm longae; styli ramuli plus quam 1 mm longi, apice ampliati setosique; achaenia pallida fere glabra 2–2.5 mm longa, annulo distali ampliata; pappi setae 5 mm longae, apicibus vix vel haud ampliatis; receptaculum alveolatum, alveolis dentatis.

JALISCO: Ca 40 km W of Ayutla, mountains in mixed fir forest between San Miguel de la Sierra and El Carmen, elev. 2000–2150 m, 29 Nov 1960, *McVaugh 21560;* 3 Nov 1962, *McVaugh 22017* (MICH, type); SE of Autlán, 6–15 km SE of Ahuacapán, pine forest, ca 2000 m, 22–23 Nov 1959, *McVaugh & Koelz 978;* 25–30 km SE of Autlán, 2 km E of summits between El Chante and Cuzalapa, 2000–2250 m, 19–22 Mar 1965, *McVaugh 23104;* Nevado de Colima, NW slopes, oak-pine forest, elev. ca 1830 m, 31 Oct 1962, *Cronquist 9767.*

Although treated by E. S. Gibson (mss.) as a variety of *Senecio roldana* DC., this plant seems to have relatively little in common with that species. *S. roldana* is a characteristic plant of steep slopes in pine-oak forest, whereas *S. galicianus* is more at home in the slightly higher and more humid area where the dominant trees are pines and firs. The heads in *S. roldana* are consistently fewer and larger, on stouter, shorter, peduncles; the disk flowers are more numerous, the anthers larger; the inflorescence in *S. roldana* is coarsely branched and the heads tend to become aggregated in distinct rounded glomerules of 15–50 heads each, whereas in *S. galiciana* the slender branches tend to fork and the heads to become loosely aggregated at the periphery of a large rounded panicle. The most obvious difference between the two species is in the pubescence, which in *S. galicianus* is inconspicuous or almost wanting, whereas in *S. roldana* it usually forms a dense floccose or felty tomentum. In Nueva Galicia the heads of *Senecio roldana* are consistently discoid.

It is possible that *Senecio galicianus* is a synonym of *S. kerberi* Greenm., of which the type and only known specimen is now lost. The original locality is thought to have been somewhere on the slopes of the Nevado de Colima.

Senecio mexicanus McVaugh, sp. nov.

Herba perennis erecta foliosa 1–2.5-metralis, caule non fistuloso basi 1 cm diametro, e caudice breve lignoso gemmis brunneo-lanosis radicibusque fasciculatis carnosis, oriundo; caulis pars inferior foliaque pilis multicellularibus flaccidis rare

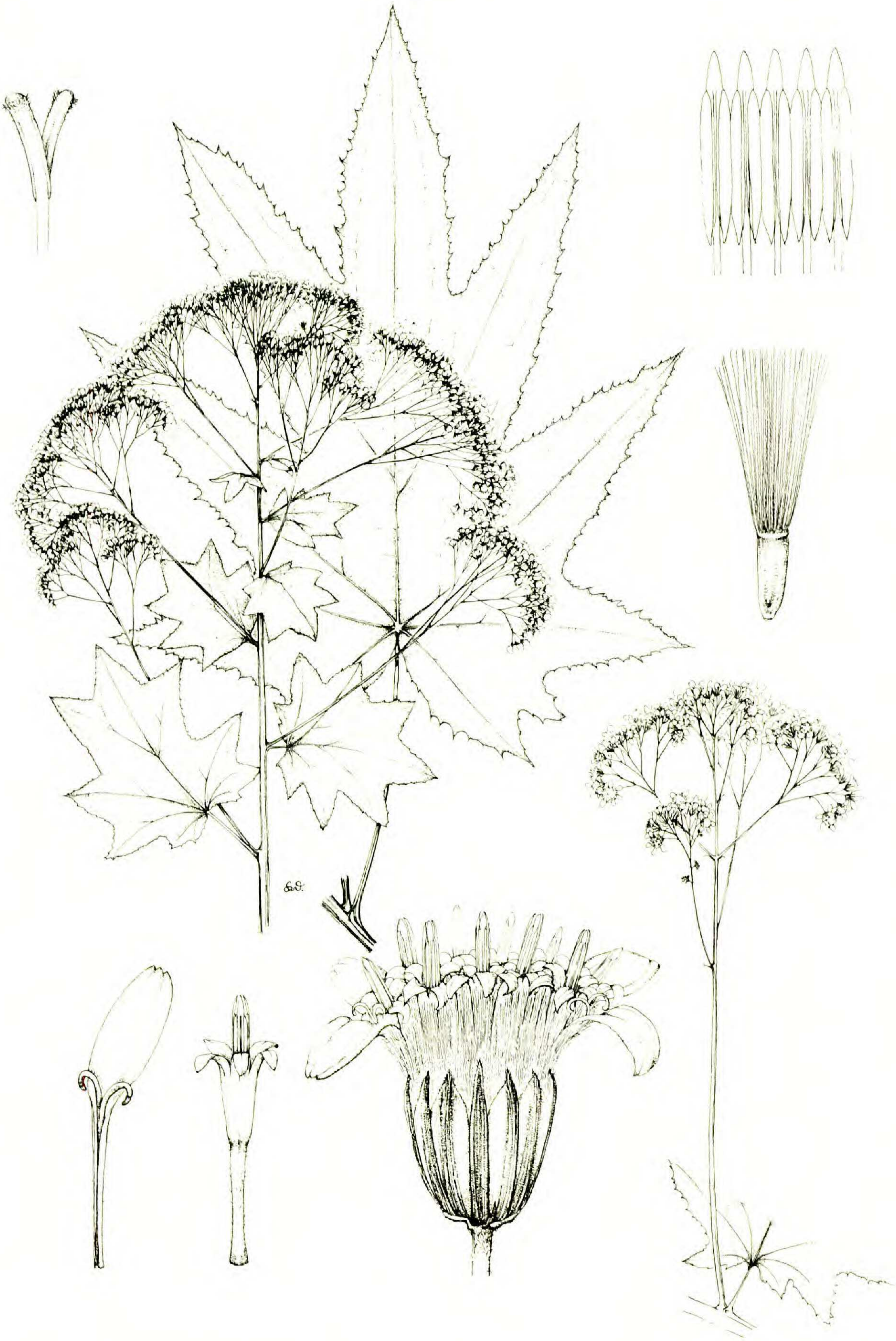

FIG. 55. *Senecio galicianus* (*McVaugh 22017*, type). Cauline leaf and diagram of inflorescence, X ¼; flowering branchlet, X ½; flowering head with some rays removed, corollas, and immature achene, X 5; anthers and style-tips, X 10.

pubescentia, et per pilorum bases persistentes paullo asperata, caulis pars superior inflorescentiaque glabra; folia ambitu suborbicularia, 10–20 cm longa lataque, palmatim 7–9-lobata, lobis majoribus plerumque 7–9 ovatis vel deltoideis 1.5–3 cm altis, interdum prope basin lobis minoribus instructa; lobi acuti vel obtusi, mucronati, marginibus loborum calloso-denticulatis, inter lobos saepe dentatis; laminae basi late sed non profunde cordatae; petioli foliorum majorum 6–20 cm longi; venatio palmata, venarum basalium paribus 3 vel ultra fere una abeuntibus, venulis supra reticulum subtile elevatum formantibus; inflorescentia terminalis ad 30–50 cm alta, composita, cymosa, corymbiformis, ramis inferioribus per folios caulinos deminutos breve petiolatos subtentis, ramulis minoribus per bracteas angustas glabras; capitula conferta, discoidea ca 1.5 cm longa, ad 50 vel ultra in quoque ramo versus apicem cymose aggregata, pedunculis bracteatis 3–10 (–20) mm longis; involucrum anguste campanulatum, bracteis accessoriis 5–8 appressis, rigidiusculis, obtusis, linearibus, 1–3 mm longis suffultum; phyllaria 8 subaequalia, apicibus minute pubescentibus exceptis glabra, 7–10 mm longa, exteriora linearia acuta 1–1.3 mm lata, interiora elliptica, obtusiora, 1.8–2.6 (–4) mm lata, tenuimarginata; flores disci (5–) 9–12 (–17), corollis glabris 9–10 mm longis aureis vel aurantiacis, tubo basi campanulato 4–5 mm longo, fauce saepe manifeste infundibuliformi, lobis lanceolatis recurvatis 1.7–3 mm longis; antherae 3.5–4.5 mm longae; styli ramuli 1.5–2 mm longi, apicibus ampliati, setosi; achaenia (immatura) plus quam 3 mm longa, ut videtur subfusiformia, longitudinaliter striata, apice in annulum pallidum ampliata, pilis pallidis brevibus inflatis obsita; pappi setae plurimae, capillares 6–8 mm longae; receptaculum alveolatum.

JALISCO: Tecalitlán, Sierra del Halo, pine forest, elev. 1700–2200 m, 28 Nov–1 Dec 1959, *McVaugh & Koelz 1170, 1262;* Huejotitán, Oct 1912, *Diguet* (P).

MICHOACAN: Hills of Pátzcuaro, 11 Nov 1890, *Pringle 3332* (MICH, type); 8 km N of Pátzcuaro, pasture in oak zone, elev. 1900 m, 25 Oct 1962, *McVaugh 21929;* 2 km SE of Carapan, grassland, elev. ca 1750 m, 22 Oct 1960, *Pippen 42.*

MEXICO: Temascaltepec, Nanchititla, oak forest, 26 Nov 1935, *Hinton 8745.*

GUERRERO: Mina, Yesceros to Cruz Pacífica, oak forest, 2550 m, 26 Nov 1939, *Hinton 14905;* Mpio. de Chichihualco, 10 km W of Camotla, pine-fir forest, elev. 2500 m, 30 Nov. 1963, *Rzedowski 18010;* 1 Dec 1963, *Feddema 2789.*

Although this plant was treated by E. S. Gibson (mss.) as a variety of *Senecio suffultus,* the two are so unlike that any close relationship between them seems improbable. They are reasonably similar in vegetative characters, and in having discoid rather than radiate heads, but *S. suffultus* is a very distinctive species having few large heads that are prominently leafy-bracted at base, and with more than 100 flowers in a head. *S. mexicanus,* on the other hand, suggests in appearance and in other characters something like *S. hartwegii* Benth., a species with radiate heads.

Senecio praecox (Cav.) DC., var. **morelensis** (Miranda) McVaugh, comb. nov. *Senecio morelensis* Miranda, Anal. Inst. Biol. [Méx.] 12: 603. 1941. *?Senecio velatus* Greenm. Ann. Missouri Bot. Gard. 1: 280. *pl. 13.* 1914.

Miranda commented upon the pubescence, and upon the differences between the leaves of *Senecio morelensis* and those of *S. praecox.* He described the leaves of *morelensis* as 8–9 cm long and 3–3.5 cm wide, but I have not seen any specimens with such narrow leaves. He gave the number of phyllaries in *morelensis* as 5–7, usually 7, but in all the specimens I have examined the number is consistently 8. The most striking difference between *praecox* and *morelensis* is in the number of disk-flowers (15–18, and 6–7, respectively). Perhaps this is enough to justify a specific segregation, but other morphological differences between the populations are not great. *Senecio velatus* seems to differ from *S. praecox* var. *morelensis* in having the leaves arachnoid-tomentulose. It seems to be known only from the type (*Pringle 5160!* from "bluffs of the barranca near Guadalajara"), and unless new localities for it are discovered, it may be treated as an extreme form of *S. praecox.*

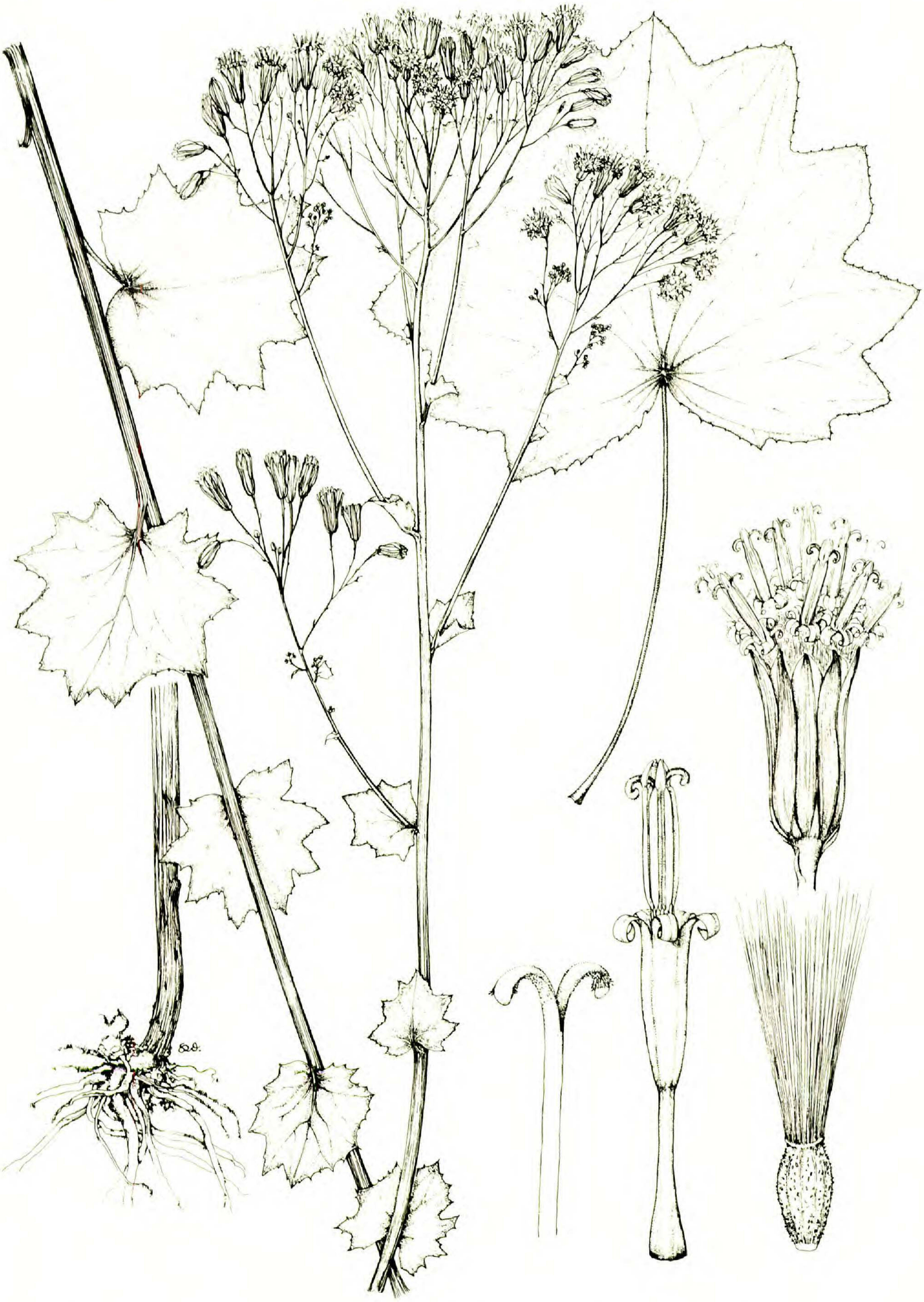

FIG. 56. *Senecio mexicanus.* Upper part of flowering plant, detached cauline leaf, base of plant, X ½; flowering head, X 2.5; corolla, X 5; style-tips, X 10 (all from *McVaugh & Koelz 1170*). Achene, X 5 (*Pringle 3332,* type).

Senecio suffultus (Greenm.) McVaugh, comb. nov. *Cacalia suffulta* Greenm. Proc. Am. Acad. 32: 310. 1897.

Pippen (Contr. U.S. Nat. Herb. 34: 435. 1968) noted that this species did not belong in any of the "cacalioid" genera, and suggested that it be referred to *Senecio*. E. S. Gibson (mss.) has indicated the same opinion, but I cannot find that the combination under *Senecio* has ever been published.

Tribe VIII. Vernonieae

Vernonia alamanii DC., var. **dictyophlebia** (Gleason) McVaugh, comb. nov. *Vernonia dictyophlebia* Gleason, Bull, N.Y. Bot. Gard. 4: 203. 1906.

Both Gleason and Blake treated these taxa as distinct species, but they are not clearly separable by the characters employed by these authors. The var. *alamanii* (known chiefly from the mountains near Mexico City) has awns of the phyllaries mostly 2–4.5 mm long. In the var. *dictyophlebia,* which ranges from western Michoacán to Guerrero and the State of Mexico, the awns are usually 0.5–1.5 mm long and the leaves tend to be broader, more veiny and more pubescent. There are various intermediate forms.

Vernonia autumnalis McVaugh, sp. nov.

Herba perennis erecta 1–2-metralis, e caudice brevi radicibus fibrosis; caules florentes plerumque solitarii, basi ad 1 cm crassi vel crassiores, sulcati, purpureo-maculati, puberulentes (vetustiores glabrescentes), ramulis laxe pilis pallidis lucidis contortis obsitis et aliquantum resinoso-globuliferis; folia caulinia 10–15 plerumque obovata, 20–30 cm longa, 8–16 cm lata, interdum profunde lobata, lobis utroque latere 2–3, ovato-triangularibus, acutis; lamina supra pallida, rare arachnoideo-tomentosa et resinoso-globulifera, supra duriuscula scabridulaque, apice late acuta, e medio vel e loco supra medium ad basin longe attenuata, petiolo proprio 1–2 cm longo vel breviore; margines supra basin laminae angustam saltem dentibus utroque latere 20–30 denticulatae vel serratae; venae laterales utroque latere 8–15 divaricatae, subtus pallidae, prominentes; folia superiora minora, oblanceolata vel elliptica, subsessilia, basi apiceque rotundata vel acuta; corymbus pauciramosus quam planta tota ca 3-plo breviora, ramis ascendentibus ad 50 cm longis, nudis vel foliaceo-bracteatis, corymbis secondariis 6–15 cm latis, 3–10 cm altis terminatis; capitula 10–12 mm longa, 5–7-flora, umbellatim quoque fasciculo 15–25 aggregata, pedunculis 2–5 mm longis suffulta; involucrum ca 7–8 mm longum, anguste campanulatum, lavandulaceum vel purpureum; phyllaria ca 20–25, bracteis sub involucrum patentibus exclusis in seriebus 3–4 principalibus disposita; phyllaria interiora longiora 5–9, elliptica, acuta, 6.5–7.5 mm longa, apicem erosum versus strigosa, cum achaeniis deciduis; phyllaria mediana et exteriora multo breviora, elliptica vel ovata, anguste acuta vel mucronata, arachnoideo-pilosa vel -ciliata; flores rosei vel subrosei, corollis 7–8 mm longis, distaliter glanduloso-globuliferis, anguste tubuloso-infundibuliformibus, lobis acutis lanceolatis 2–3 mm longis; antherae 2 mm longae, basi obtuse auriculatae, appendicibus anguste acutis 0.6–0.8 mm longis; styli ramuli purpurei, hirsuti, corollae lobos subaequantes; pappus albus, setis grossis rigidis barbellatis ca 30, 5–6 mm longis, squamellis exterioribus anguste linearibus planis 1–1.5 mm longis; achaenia albo-flavida 3–3.5 mm longa, molliter appresse-pilosa et pappi basi praecipue glanduloso-globulifera, anguste obovoidea, obscure 3-angulata costulis validis 5–7, vel compressa costulis ventralibus (1), lateralibus (2), dorsalibusque (3); receptaculum foveolatum, achaeniorum cicatricibus substipitatis.

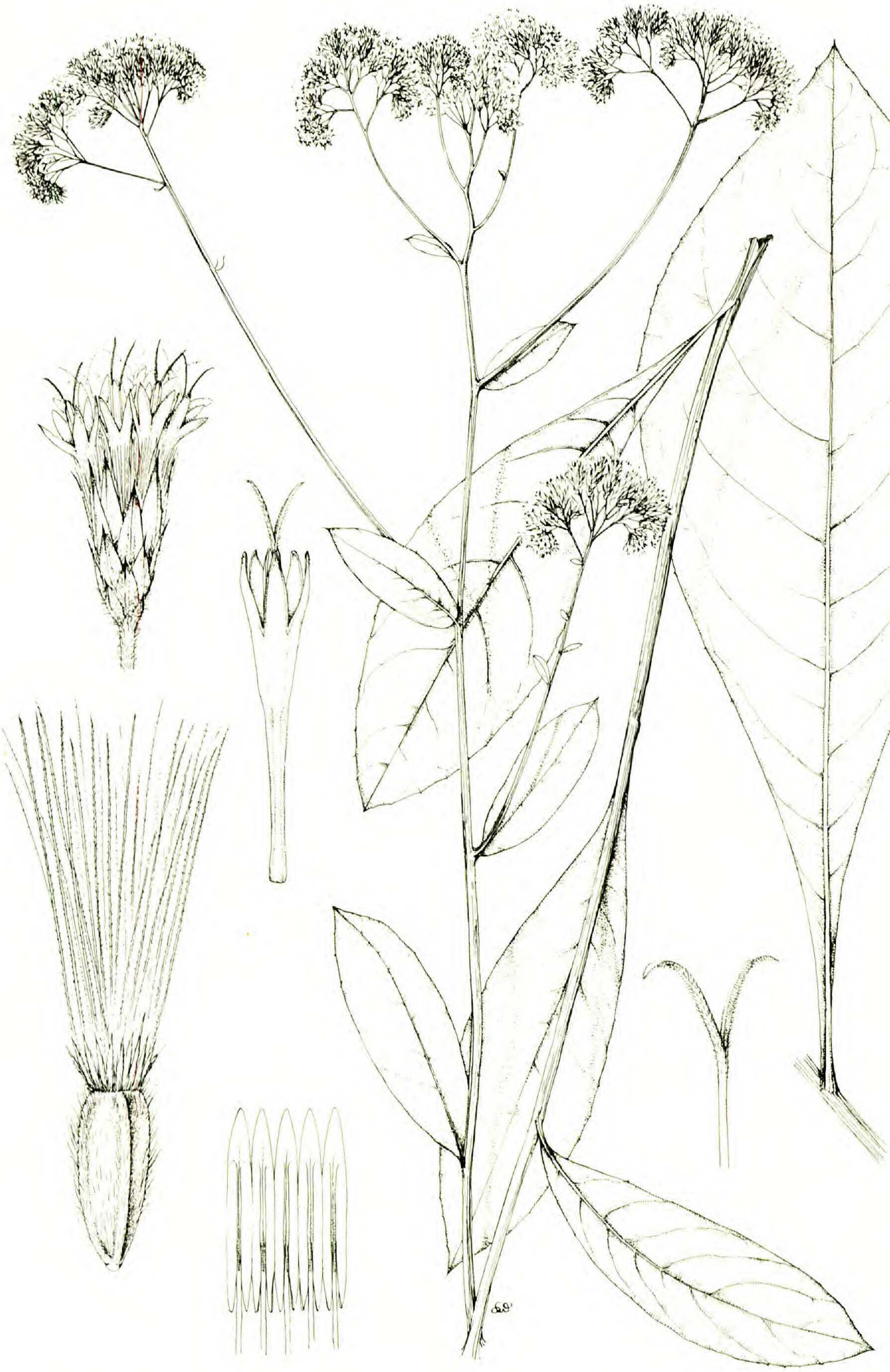

FIG. 57. *Vernonia autumnalis* (*McVaugh 19833,* type). Upper part of plant and lower cauline leaf, X ½; flowering head, X 2.5; corolla, X 5; anthers and style-tips, X 10. The achene (X 7.5) is from *McVaugh 21171.*

JALISCO: Mountainsides above La Cuesta, road to Talpa de Allende, humid forests of oak and other deciduous trees, elev. 800–1000 m, 15–16 Oct 1960, *McVaugh 20268;* 19 Nov 1960, *McVaugh 21171;* Mpio. de Cabo Corrientes, 5 km N of El Tuito, oak forest in stream valley, elev. 650 m, 16 Dec 1970, *McVaugh 25468, 25476;* 5 km S of La Huerta, in oak forest, elev. 500–550 m, 3 Oct 1960, *McVaugh 19833* (MICH, type).

The 5–7-flowered heads and the deciduous inner phyllaries of this species indicate some relationship with what Gleason treated as a distinct genus, *Eremosis* (N. Am. Flora 33: 95–101. 1922). By most recent authors these species have been included in *Vernonia.* As far as I can learn, all the other North American species are shrubby.

Vernonia bealliae McVaugh, nom. nov. *Vernonia corymbiformis* sensu Gleason, Bull. N.Y. Bot. Gard. 4: 198. 1906, not *V. corymbiformis* DC. 1836.

JALISCO: San Sebastián, *Nelson 4098* (GH, type; US), *Mexia 1637* (US), *1766* (MICH, US), *Anderson & Anderson 5958;* Talpa de Allende, *McVaugh 23430;* Autlán, *McVaugh 10331;* Tecalitlán, *McVaugh & Koelz 1165.*

MICHOACAN: Coalcomán, *Hinton 13674* (US), *McVaugh 22730.*

Although Gleason used the name *Vernonia corymbiformis* DC. for this species, he said "that this identification is correct is by no means certain." In fact DeCandolle's specimen (*Karvinski! s.n.,* in G–DC), from some unknown locality in Mexico, apparently represents a species not found in Nueva Galicia. The leaves are pubescent beneath, the inflorescence and peduncles pubescent, the involucre nearly glabrous, 9 mm high, the phyllaries about 40, the outer ones tapering then with terminal cusp 0.3–0.4 mm long; the inner phyllaries are membranous, lanceolate, 1.5 mm wide, acute, scarcely cuspidate. This agrees well with the original description (in DC. Prodr. 5: 62. 1836).

In *V. bealliae* the phyllaries are about 50, all subulate-tipped and often notched at the base of the awn. *V. bealliae* is a plant of steep barrancas and humid forested mountainsides with *Abies, Pinus, Quercus* and other broad-leaved trees, at elevations from 1600 to 2600 m, flowering December to April. Apparently it is unknown except from Nueva Galicia.

Vernonia cordata H.B.K. Nov. Gen. & Sp. 4: 39. 1820. *Vernonia morelana* Gleason, Bull. Torrey Bot. Club 46: 241. 1919.

Gleason, in his work on the North American Vernonieae, seems not to have noted the name *Vernonia cordata.* The type, which I studied in Paris in May 1970, has cordate, petiolate leaves tomentose beneath; the flowers are about 10 in a head and the achenes glandular. Kunth, in the protologue, made special note of this last feature, which Gleason also emphasized as characteristic of *V. morelana.*

The var. *cordata* is found in the State of Mexico, in Morelos (*Pringle 7697!*, the type of *V. morelana*), and in Guerrero (Taxco, *Humboldt & Bonpland!,* the type). In this population the plants are a little more densely pubescent than those in Nueva Galicia, the petioles of the branch-leaves are 7–12 mm long (as against 3–5 mm), and the achenes are copiously dotted with large pale resinous globules. The heads of *V. morelana* were described by Gleason as 21-flowered, but in most specimens of both varieties there are 10–12 flowers in a head.

Vernonia cordata H.B.K., var. **hooveri** McVaugh, var. nov.

Frutex arborescens 3–6-metralis, tomentosus, foliis caulinibus elliptico-ovatis 20–30 cm longis, ramorum florentium 5–10 cm longis, petiolis 3–5 mm longis; capitula plurima, subumbellatim fasciculata, cymis obscure scorpioideis, ramis non manifeste racemosis sed prope apices capitula 1–4 sessilia ferentibus, vel capitulis paucis pedunculatis; capitula 9–12-flora; phyllaria arachnoideo-ciliata ca 25, interiora (achaenia subtendentia) 8–9; corolla 6 mm longa; achaenia clavato-columnaria, immatura 2.5–2.8 mm longa, strigosa sed vix vel haud glandulosa.

Varietas amici olim in terram mexicanum comiti David Beall Hoover, qui mecum anno 1951 plantas ejusdem varietatem collectavit, nominavi.

JALISCO: 10–11 km NE of Talpa de Allende, in oak-pine forest, elev. 1500 m, 1 May 1951, *McVaugh 12217* (MICH, type); Nevado de Colima, SE foothills in oak-pine forest, elev. ca 1600 m, 5 Apr 1951, *McVaugh 11802;* 16 km NE of Tecolotlán, dry oak forests near summits, elev. ca 1680 m, 10 Apr 1951, *McVaugh 11964;* S of Jilotlán de los Dolores, deciduous forest, elev. 800 m, 9–10 Mar 1965, *McVaugh 22912.*

MICHOACAN: 7–15 km from Ario de Rosales, road to Gabriel Zamora, oak forest, elev. 1100–1350 m, 22 Feb 1970, *Anderson & Anderson 5835.*

GUERRERO: Dist. Montes de Oca, San Antonio, 14 Apr 1938, *Hinton 14009;* Mpio de Tlacotepec, Aserradero de Yerba Santa, pine-oak forest, 2000 m, 12 Apr 1963, *Rzedowski 16533.*

Vernonia feddemae McVaugh, sp. nov.

Herba perennis valida erecta plus quam 1-metralis, caule striato 5–7 mm crasso, inferne glabrescenti, superne pubescenti, ramulis phyllariisque copiose pilis lucidis basi rigidis sed contortis, implexis, obsitis; phyllaria etiam arachnoideo-ciliata; folia coriacea, supra laevia glabraque, subtus sparsim arachnoideo-tomentosa; globulae resinosae pallidae in foliorum superficiebus inferioribus (abaxialibus), ramulis, phyllariis, corollae lobisque abundantes; folia pennivenia ovata vel oblonga vel elliptica, 8–12 cm longa, 3–5 cm lata, acuta vel obtusa, basi rotundata, marginibus obscure denticulatis, revolutis plerumque ut videtur integris, basi breviter cuneatim in extensionem petioliformen 2–5 mm longam productis, petiolo ipso nullo vel ad 5–6 mm longo; corymbus terminalis myriocephalus ca 35 cm altus latusque, ramis principalibus valde ascendentibus 5–6, 3–4-plo diffuse furcatis, prope medium foliato-bracteatis, in corymbis secondariis terminantibus; capitula erecta, angusta, ca 1 cm longa, 3–5-flora, ramulis gracilibus pedunculiformibus 1–1.5 cm longis suffulta, quoque ramulo bracteis 6–15 ovatis vel orbiculatis vel obovatis 1–2 mm longis, cucullatis, pubescentibus instructo; involucrum ca 6 mm longum, 3–4-seriatum, phyllariis exterioribus gradatim brevioribus, extimis in pedunculi bracteas sensim transientibus; phyllaria 20–25, apicibus et nervo medio valido subcarinato purpurascentia, interiora longiora 3 (–5), elliptica vel oblanceolata, 5–6 mm longa, 1.3 mm lata, acuta vel breve acuminata mucronataque, facile separata sed cum floribus non statim cadentia, marginibus tenuibus glabris; phyllaria mediana exterioraque plerumque ovata, apicibus mucronatis, fere latitudine tota pubescentia; flores purpurei; corolla infundibuliformis 8–9 mm longa; antherae 2 mm longae, basi auriculatae, appendicibus acutis lanceolatis 0.6–0.8 mm longis; pappus 4.5 mm longus, setis ca 30 albis grossis barbellatis, squamellis exterioribus lineari-subulatis 0.7–1.3 mm longis; achaenia recta 2.5 mm longa, distaliter ampliata, dorso-ventraliter compressa, ca 8-costulata, pilis longis, sericeis pallidis dense obsita, sed ut videtur non glandulosa; receptaculum fere planum, achaeniorum cicatricibus rotundatis.

NAYARIT: Pastures and clearings ca 5 km NE of Puga (ca 15 km NE of Tepic), elev. ca 1000 m, 22 Aug 1959, *Feddema 846A* (MICH, type).

In habit this suggests the species related to *Vernonia serratuloides* H.B.K., *V. capreaefolia* (Sch. Bip.) Gleason, and *V. sinclairii Benth.*, but all those have 8 or more flowers in a head. The repeated forking of the branches of the corymb, and long peduncle-like but multibracteate branchlets that support the heads, appear to be unique among Mexican Vernonias.

Vernonia koelzii McVaugh, sp. nov.

Frutex 2.5-metralis ramis longis arcuatis, caulibus minute glandulari-papillosis, ramis etiam paullo pubescentibus; rami hornotini petiolique canescentes; phyllaria dorso marginibusque arachnoideo-pilosa; folia supra maturitate glabra vel subglabra, bullata (venulis paullo impressis), epidermidis cellulis convexis refractivisque; pagina folii inferior resinoso-globulifera, pilis 1 mm longis vel brevioribus grosse sed rare pilosa; folia penninervia ovata 10–21 cm longa, 4–7.5 cm lata, 2–3-plo longiora quam latiora, ad apicem acutum vel acuminatum sensim angustata, basi rotundata, marginibus obscure calloso-denticulatis, petiolis 5–10 mm longis; rami foliacei florentes saepe 0.5–1 m longi, ramulis paucis (2–5) ascendentibus 15–30 cm longis, capitulis in ramulis spurie racemosis sessilibus, solitariis vel binis in nodis 1–2.5 cm distantibus, nodis per bracteas foliaceas lanceolatas 2–6 cm longas subtentis; capitula 1 cm longa, 24–25 (–30?)-flora; involucrum 7–8 mm longum, cyathiforme, basi rotundatum, 4–6-seriatum, phyllariis exterioribus multo brevioribus; phyllaria rigida 50–60,

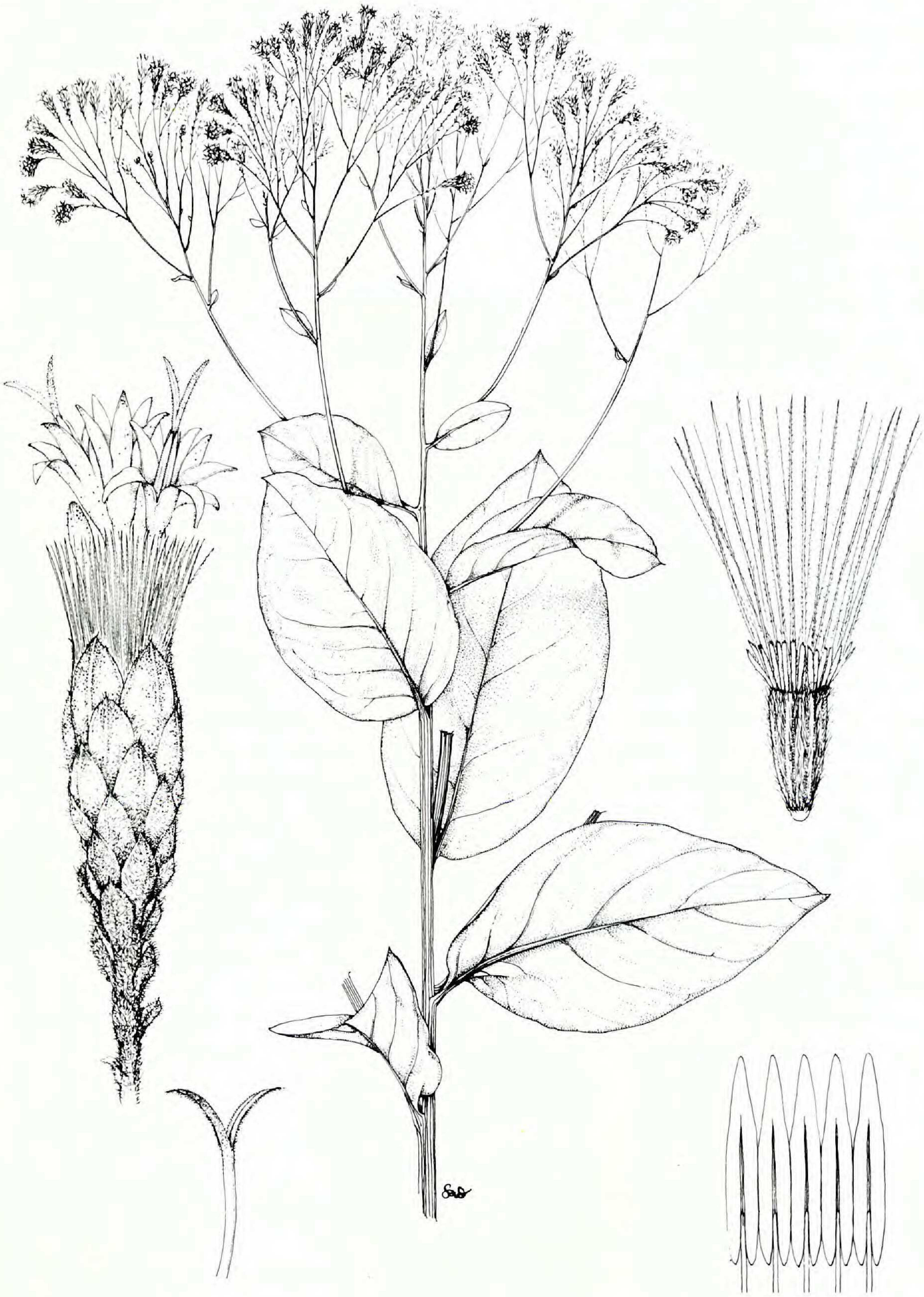

FIG. 58. *Vernonia feddemae (Feddema 846A,* type). Upper part of plant, X ½; flowering head, X 5; achene, X 7.5; style-tips and anthers, X 10.

purpurascentia, interiora longiora 15–19 (–21?), achaenia subtendentia, lanceolata, 1.5–2 mm lata, apicibus tenuibus, acutis brevissime mucronatis; phyllaria mediana exterioraque ovata vel lanceolata, apicibus attenuatis spinulosis, extima laxe subpatentia; flores purpurei; corolla pro capituli magnitudine brevis, 7 mm longa, anguste infundibuliformis, lobis angustis acutis 2 mm longis, prope apices resinoso-globuliferis; antherae flavidae 2–2.3 mm longae, longe exsertae, basi auriculatae, appendicibus 0.5–0.8 mm longis; styli ramuli ca 2 mm longi hispidi attenuati; pappus setis albis ca 25, rigidis barbellatis 6 mm longis, squamellis exterioribus planis lineari-subulatis 1–1.8 mm longis; achaenia (immatura) 2.5 (–3?) mm longa, clavato-columnaria, truncata, dense pilis albis appressis obsita, prope basin glanduloso-globulifera, costulis ca 10 convexis instructa; receptaculum ca 2 mm latum, glabrum, reticulatum.

COLIMA: Mountain summits near the pass ca 17–18 km SSW of Colima, in area of gypsum and slate, in deciduous forest of *Bursera, Amphipterygium, Cyrtocarpa, Cephalocereus,* elev. 400–500 m, 7–8 Dec 1959, *McVaugh & Koelz 1576* (MICH, type). Otherwise unknown.

This is apparently one of a small group of North American species having large sessile heads in elongate leafy-bracted cymes, pubescent achenes, acute phyllaries and broad ovate leaves. The inflorescence and the involucre in *V. koelzii* resemble those of *V. argyropappa* Buek, but that is usually herbaceous, with narrower and evidently sericeous-pilose leaves, and subulate phyllaries.

Vernonia michoacana McVaugh, sp. nov.

Frutex procerus arborescens 3–4-metralis, puberulens, resinoso-globuliferus, interdum pilis brevibus erectis rigidis instructus; inflorescentia foliaque utrinque pubescentia, vel folia demum venis majoribus exceptis glabra; phyllaria extima tomentulosa; folia elliptico-lanceolata, 8–12 cm longa, 2–3.5 cm lata, 3–3.5-plo longiora quam latiora, penninervia, subtus crebre resinoso-globulifera, apice acuta vel obtusa, basi acuta vel paullo rotundata, marginibus revolutis, remote denticulatis vel omnino integris, basi breviter cuneatim decurrentibus, petiolis fere nullis vel 2–4 mm longis; inflorescentia paniculiformis rotundata vel paullo elongata 20–30 cm longa, 20–25 cm lata, ramis divaricatis foliato-bracteatis 8–12 cm longis, quoque ramo fasciculum confertum capitulorum 50–100 parvorum pallidorum ferenti, pedunculis 1–1.5 mm longis vel brevioribus; capitula 1-flora, 9–10 mm longa, involucrum cylindro-campanulatum 4.5–5.5 mm longum, multo longius quam latius, phyllariis 3–4-seriatis, exterioribus longitudine valde decrescentibus; phyllaria ca 15, albo-viridia vel exteriora saltem apicibus brunnescentibus, ciliata, exterioribus exceptis glabra, prope apicem resinoso-globulifera; phyllaria interiora longiora 4–5.5 mm longa; anguste elliptico-lanceolata, 0.7–0.9 mm lata, obtusa vel subacuta, intima 3 multo longiora, facile separata et sub anthesi etiam cadentia; phyllaria mediana exterioraque late elliptica vel late ovata, plerumque obtusa; flores albi vel pallide subrosei; corolla sparsim resinoso-globulifera 6–7 mm longa, tubo subcylindrico 2.5–3 mm longo, 0.3 mm crasso, in faucem dilatatam transienti, lobis angustis acutis 2.5 mm longis; antherae 1.7 mm longae, basi auriculatae, bene exsertae, appendicibus acutis 0.7 mm longis; styli ramuli 1.5 mm longi; pappi setae principales albae ca 35, barbellatae 4.5 mm longae, exteriores setiformes 0.5–1.5 mm longae; achaenia clavato-columnaria immatura 2 mm longa, teretia, obscure costulata, pilis sericeis pallidis appressis dense obsita; receptaculum glabrum, achaenii cicatrice elevata.

MICHOACAN: Ca 8 km NW of Aguililla, road to Aserradero Dos Aguas, thickets in oak zone, elev. 1200 m, 2 Mar 1965, *McVaugh 22668* (MICH, type); ca 20 km S of Arteaga, in oak forest, elev. 825 m, 25 Feb 1965, *McVaugh 22556*. Otherwise unknown.

In the basin of the Río Tepalcatepec and the dry mountains in nearby Michoacán this seems to be the only representative of the species-complex that includes *Vernonia salicifolia* (DC.) Sch. Bip and the very similar *V. pallens* Sch. Bip. In Nueva Galicia *V. salicifolia* is a plant of rocky woods and summits above 2000 m, mostly on the Central

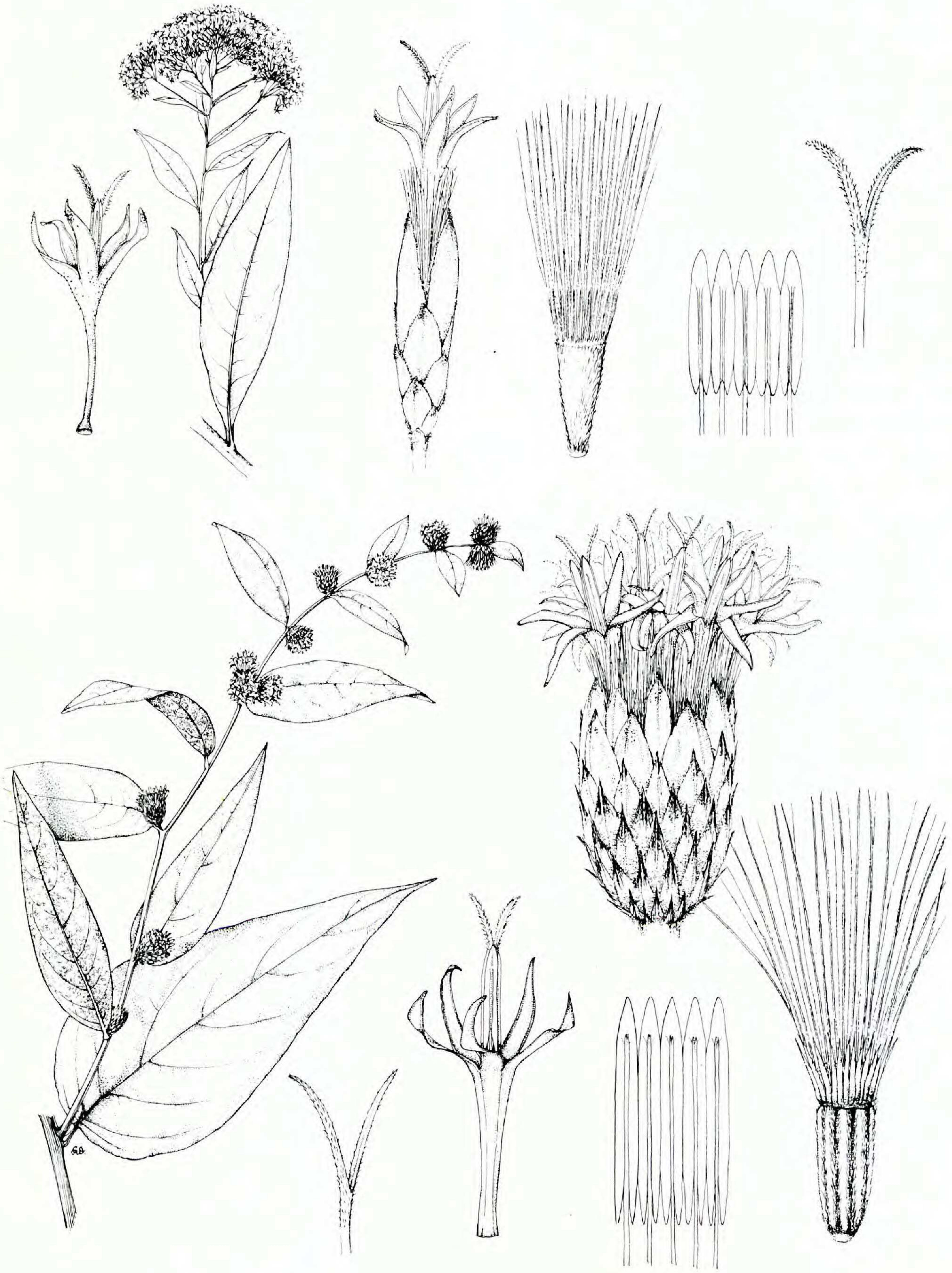

FIG. 59. *Vernonia koelzii* and *V. michoacana. V. koelzii* (lower figures, all from *McVaugh & Koelz 1576,* type): Flowering branch, X ½; flowering head, X 4; corolla, X 5; achene, and style-tips, X 7.5; anthers, X 10. *V. michoacana* (upper row of figures, all from *McVaugh 22668,* type): Flowering branchlet, X ½; flowering head, and corolla, X 5; achene, and style-tips, X 7.5; anthers, X 10.

Plateau. The heads are invariably purplish, larger than those of *V. michoacana,* with corollas 11–13 mm long. *V. pallens* is a somewhat doubtful species, treated by both Gleason and Blake as synonymous with *V. leiophylla* (Gleason) Blake. In the type of *V. leiophylla (Pringle 6188!),* from above Cuernavaca, Morelos, the involucres are pale (not purplish), the leaves tend to be tufted in the vein-axils beneath (as in *V. salicifolia* but not in *V. michoacana*), the corollas are about 9 mm long, and the inner phyllaries are about 1.5 mm wide, narrowly acute or even mucronate. Pending a thorough revision of the entire complex, *V. michoacana* is maintained as distinct from the other taxa involved.

Vernonia salicifolia (DC.) Sch. Bip., var. **baadii** McVaugh, var. nov.

Frutex procerus vel arborescens 2–4 m altus, fere glaber; folia subtus in venarum majorum axillis plerumque barbata, pennivenia, 8–20 cm longa, (2.5–) 4–7 cm lata, 2.3–3 (–3.7)-plo longiora quam latiora, petiolis 8–15 mm longis; involucrum 4.5–5.5 mm longum, purpureum; phyllaria acuta 15–20, interiora 1.5 mm lata; corolla 8.5 mm longa; antherae 2.3 mm longae. A varietatibus ceteris folia latiora, petiolis longioribus, floribus minoribus, differt.

Varietas in honorem dixi Michael Francis Baad (1941–), botanici nunc californici, qui mecum anno 1965 plantas mexicanas plurimas collectavit.

JALISCO: San Sebastián, Arroyo del Triangulo, elev. 1425 m, 20 Mar 1927, *Mexia 1904;* Talpa de Allende, headwaters of a west branch of Río de Talpa, pine forest, elev. 1200–1450 m, 28–30 Mar 1965, *McVaugh 23329;* 20 km SE of Talpa, 8–10 km S of El Rincón, mountain stream valley, elev. 1600 m, 2–3 Apr 1965, *McVaugh 23473* (MICH, type).

MICHOACAN: Coalcomán, elev. 1000 m, 14 Mar 1939, *Hinton 13651.*

Mrs. Mexia's collection was originally named *Vernonia pallens,* and Hinton's collection *V. salicifolia.* As explained above under *V. michoacana,* the taxonomy of this whole species-complex remains to be worked out. What is described here as var. *baadii* is a broad-leaved, long-petioled extreme that seems to be localized in relatively humid situations in the mountains of the Pacific slope of Jalisco and Michoacán, where no other representative of *V. salicifolia* is known.

Vernonia steetzii Sch. Bip., var. **aristifera** (Blake) McVaugh, comb. nov. *Vernonia aristifera* Blake, Contr. U.S. Nat. Herb. 23: 1415. 1926.

There is much variation in the extent to which the phyllaries are mucronate in this species, and it does not seem possible to separate *V. steetzii* from *V. mucronata* Blake [=*V. foliosa* (Benth.) Sch. Bip.] on the basis of this one feature, as was done by Gleason and Blake. *V. aristifera* belongs to the same complex; in its extreme form it seems quite different from *V. steetzii* because of its prevailingly ovate and tomentose leaves, very slightly larger heads, and longer mucros on the phyllaries. In northeastern Jalisco and nearby Aguascalientes and San Luis Potosí, however, many plants are intermediate in pubescence, in leaf-shape and in the length of the mucros, between typical *V. steetzii* as it occurs a little farther west and northwest, and *V. aristifera* which is mainly a plant of somewhat lower elevations in central Jalisco.